Trends and Sources of Zoonoses, Zoonotic Agents and Antimicrobial resistance in the European Union in 2004

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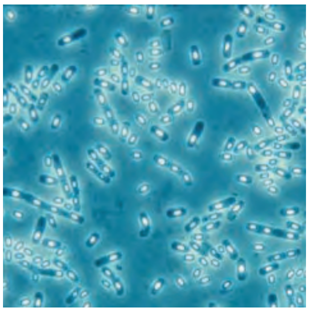

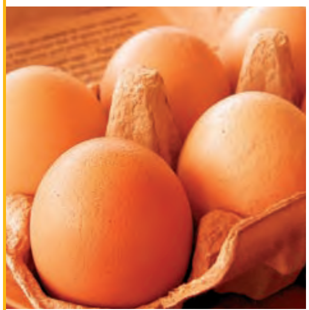

TRENDS AND SOURCES OF ZOONOSES, ZOONOTIC AGENTS AND ANTIMICROBIAL RESISTANCE IN THE EUROPEAN UNION IN 2004

February 2006

European Food Safety Authority

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About EFSA

The European Food Safety Authority (EFSA) was established and funded by the European Community as an independent agency in 2002 following a series of food scares that caused the European public to voice concerns about food safety and the ability of regulatory authorities to fully protect consumers.

In close collaboration with national authorities and in open consultation with its stakeholders, EFSA provides objective scientific advice on all matters with a direct or indirect impact on food and feed safety, including animal health and welfare and plant protection. EFSA is also consulted on nutrition in relation to Community legislation.

EFSA's work falls into two areas: risk assessment and risk communication. In particular, EFSA's risk assessments provide risk managers (EU institutions with political accountability, i.e. the European Commission, European Parliament and Council) with a sound scientific basis for defining policy-driven legislative or regulatory measures required to ensure a high level of consumer protection with regards to food and feed safety.

EFSA communicates to the public in an open and transparent way on all matters within its remit.

Collection and analysis of scientific data, identification of emerging risks and scientific support to the Commission, particularly in case of a food crisis, are also part of EFSA's mandate, as laid down in the founding Regulation (EC) No 178/2002 of 28 January 2002.

EFSA is responsible for examining the data on zoonoses, antimicrobial resistance and food-borne outbreaks collected from the Member States in accordance with Directive 2003/99/EC and for preparing the Community Summary Report from the results. The Zoonoses Collaboration Centre (contracted by EFSA) in the Danish Institute for Food and Veterinary Research assisted EFSA in this task.

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European Food Safety Authority
The Community Summary Report on Trends and Sources of Zoonoses, Zoonotic Agents and Antimicrobial Resistance in the European Union in 2004
21 December 2005

EXECUTIVE SUMMARY

Zoonoses are diseases, which are transmissible from animals to humans. The infection can be acquired directly from animals, or through ingestion of contaminated foodstuffs. The seriousness of these diseases in humans can vary from mild symptoms to life threatening conditions. In order to prevent these diseases, it is important to identify which animals and foodstuffs are the main sources of these infections. For this purpose, information is collected from all over the European Union (EU) and analysed, so that the right control measures can be taken in a timely manner to protect human health.

This year's annual Community Summary Report on Trends and Sources of Zoonoses, Zoonotic Agents and Antimicrobial Resistance reveals that by far the most frequently reported zoonotic diseases in humans are salmonellosis and campylobacteriosis. In 2004, 192,703 salmonellosis and 183,961 campylobacteriosis cases were recorded in the Member States. In previous years the numbers of salmonellosis cases decreased, but from 2003 to 2004, with the expansion of the EU to include 10 new Member States, these figures increased again. In contrast, there has been a general increase in reported cases of campylobacteriosis over the last few years in the old Member States.

Every year, all of the European Union's Member States submit information on the occurrence of zoonoses and food-borne disease outbreaks to the European Commission. This data collection currently covers 11 zoonotic diseases. This year, for the first time, the European Food Safety Authority (EFSA) analysed the information and published the results in this annual Community Summary Report.

In addition to the reported cases of salmonellosis and campylobacteriosis, *Yersinia* bacteria were reported to have caused over 10,000 human cases in the EU, and the other bacterial zoonoses – listeriosis, verotoxin producing *Esherichia coli* (VTEC) infections and brucellosis – each accounted for approximately 1,000-4,000 cases reported to the Commission. The numbers of reported listeriosis and VTEC cases seem to be increasing, while the reported numbers of brucellosis cases indicate a decline. The actual number of human tuberculosis cases caused by the bovine tuberculosis bacteria is hard to estimate due to incomplete data, but a total of 83 cases were reported in the EU. Listeriosis accounted for the highest number of reported fatalities (107 deaths) in 2004.

In general, parasitic zoonotic infections caused fewer human cases than zoonotic bacteria did. There were around 300-400 reported cases due to *Trichinella* and similar numbers of cases caused by *Echinococcus* parasites. *Toxoplasma* was responsible for almost 2,000 cases. Two humans contracted the rabies virus in the EU, but the infections originated from countries outside the EU.

Zoonotic bacteria were reported from a variety of different food categories and animal species. The highest *Salmonella* contamination rates were found in poultry and pigs and the fresh meat from these animals indicating that eggs, poultry meat and pork are major sources of human *Salmonella* infections. Poultry meat also showed the highest *Campylobacter* contamination levels. VTEC bacteria were mostly related to cattle and meat from these, whereas *Yersinia* bacteria were often reported both from pigs and cattle and their products. Ready-to-eat meat, dairy and fishery products seemed to form the most significant sources for *Listeria monocytogenes*, the cause of human listeriosis.

Trichinella and *Echinococcus* parasites were very seldom detected in pigs and horses during meat inspections, although both of these parasites were found more often in wild animal species, indicating that wildlife is a reservoir for these parasites. This applies also to the rabies virus, where little evidence was found in domestic animals in contrast to findings in the wildlife.

Information on food-borne disease outbreaks were collected in the past at the EU level but for the year 2004 it has been extensively summarised for the first time. A total of 19 Member States submitted this information on voluntary basis. These countries reported a total of 6,860 outbreaks with 42,447 people affected. Of these cases, there were 13 that resulted in death. *Salmonella* was the most frequently reported cause for these outbreaks.

The information submitted on antimicrobial resistance in zoonotic bacteria indicated that animals and food of animal origin might serve as reservoirs for resistant bacteria with the risk of direct or indirect transfer of resistant bacteria to humans.

All of the 10 new Member States reported information for the first time in 2004, adding some new features to EU total figures. Some new Members States reported relatively higher numbers of salmonellosis or trichinellosis cases in humans than were reported from the old Member States. In animals the *Trichinella* parasites and rabies virus were also in many new Member States more commonly found.

Norway also takes part in the data collection system, as the only non-EU Member State making the overall picture more complete.

When interpreting the results in the report, one should bear in mind that the figures are in most cases not directly comparable between the countries due to differences in the reporting and monitoring procedures in place in the Member States.

TABLE OF CONTENT

1. INTRODUCTION

The Community system for monitoring and collection of information on zoonoses was established by Council Directive 92/117/ECC (The Zoonoses Directive). This Directive sets rules for the Member States (MS) of European Union (EU) to collect, evaluate and report to the Commission, each year, data on specific zoonoses and zoonotic agents in animals, foodstuffs and feedingstuffs. At the end of the 1990’s, the Commission considered it necessary to revise the existing rules on monitoring and reporting of zoonoses. The aim was to improve the system, in particular regarding the comparability of data, and to extend the system to cover additional zoonoses on mandatory basis and certain other important aspects such as antimicrobial resistance and foodborne outbreaks. The new Zoonoses Directive 2003/99/EC was adopted by the Council and the European Parliament on 17 November 2003, and it instated as of 12 June 2004. Reporting according to the new rules in Directive 2003/99/EC will start with data collected during 2005.

In 2004, data was collected according to the former Directive 92/117/EEC covering 11 zoonotic agents and zoonoses: *Salmonella, Campylobacter, Listeria monocytogenes*, verotoxin producing *E. coli*, tuberculosis due to *Mycobacterium bovis, Brucella, Yersinia, Trichinella, Echinococcus, Toxoplasma* and rabies. In addition, data on antimicrobial resistance in *Salmonella* and *Campylobacter* and *E. coli* as well as foodborne outbreaks were reported. The European Food Safety Authority (EFSA) has been assigned the tasks of examining the data collected and preparing the Community Summary Report. The Zoonoses Collaboration Centre (the Danish Institute for Food and Veterinary Research) prepared the Community Summary report under the supervision of EFSA.

The 25 MS (EU-25), including the 10 new MS (EU-10), and Norway submitted national zoonoses reports for 2004. The 15 old MS (EU-15) and Norway have submitted zoonoses reports in previous years, and four of the new MS, Latvia, Lithuania, Cyprus and Slovenia reported on a voluntary basis already for 2003.

For the first year, MS submitted data using a new online zoonoses reporting system that was created and is maintained by the EFSA. All MS successfully reported national zoonoses data for 2004 using this system. This data, along with data submitted in subsequent years will be stored in a central data repository, facilitating data access and analysis.

The deadline for data submission was, exceptionally for this year, 5 July 2005. Data was frozen in the zoonoses database as of 2 August 2005. Any subsequent data submissions or amendments made by the MS were recorded in the database indicating the amendment date(s) and appear in the national zoonoses report. Data were extracted for analysis immediately following the freezing of the database and data amendments were incorporated within this dataset if at all possible. The draft Community Summary report was sent to MS for consultation and comments were collected by 29 November 2005. The utmost efforts were made to incorporate these comments and data amendments within the available time frame.

The Community Summary Report is divided into 3 levels. Levels 1 and 2 are combined for this year, and they consist of a general summary and a Community assessment with interpretation of the trends and sources, covered by data analysis for each pathogen, as well as an overview of monitoring programmes implemented in the Community. The combined levels 1 and 2 are published in print form as well as on EFSA website and are made available to European Community stakeholders. Level 3 of the report consists of an overview of all data submitted by the MS. This level of the report is only available on EFSA website and in the CD ROM.

Monitoring and surveillance schemes for most zoonotic agents covered in this report are not harmonised between different MS, therefore findings presented in this report must be carefully interpreted. The data presented may not necessarily be derived from national sampling plans that are statistically modelled, and therefore, may not accurately represent the national situation on zoonoses. Results are generally not directly comparable between MS.

Data presented in this report were chosen such that trends could be identified whenever possible. As a general rule, and as described, for food and animal samples, a minimum number of 25 samples tested were required to be selected for data analysis. Historical data and trends are presented whenever possible.

The human, animal and herd populations profiles of the MS from 1999 to 2004 are presented within the Appendix of the report, Table PO1 to PO3.

2. SUMMARY

2.1. Zoonoses specific summaries

Salmonella

Humans

A total of 192,703 cases of salmonellosis were reported by 24 MS in 2004. The incidence was 42.2 cases per 100,000 population, which represents an increase of 22% when compared with 2003. This increase is due mainly to the addition of the ten new MS reporting for the first time. In the old MS, a general decreasing trend of salmonellosis has been observed in recent years. This decrease is most likely due to implementation of *Salmonella* control programmes in these countries. A quarter of all reported cases in EU-25 are from children aged 0-4 years, and there is a seasonal peak during the late summer/ autumn. *Salmonella* Enteritidis serovar comprised 76% of all the reported cases in 2004.

Foodstuffs

Data on *Salmonella* were reported for a wide range of foodstuffs. The majority of samples were collected from various types of meat and meat products. The lowest levels of contamination in poultry, pig, and bovine meat during the last five-year period have been reported from Finland, Sweden and Norway.

Salmonella was detected at all levels of the poultry meat production, with the highest rates of contamination observed at the slaughterhouse and processing plants. Proportions of positive samples in poultry meat were generally lower than 10%, with the lowest proportions reported in countries with control programmes in the poultry production. At retail *Salmonella* was reported in fresh poultry meat ranging from 2% to 18.5% positive samples.

A general decreasing trend of *Salmonella* in table eggs was observed in those countries that had reported consistently. In pig meat, no clear trend was discernable, except for The Netherlands where a clear reduction was observed. Most countries reported *Salmonella* prevalences in pig meat below 10%. The contamination levels in bovine meat were generally considerably lower. Some MS reported contamination of ready-to-eat-meat products at the same level as in fresh meat. Such products constitute a particular risk to human health. In milk and dairy products *Salmonella* was rarely reported. Several surveys covering spices and herbs revealed relatively high *Salmonella* contamination.

With a few exceptions, new MS generally reported similar levels of *Salmonella* in food as the old MS.

Animals

The mandatory control program for *Salmonella* in breeding flocks of fowl *(Gallus gallus)* ensures relatively comparable data within the Community. Overall, 6.3% of the laying hen breeding flocks and 3.3% of the broiler breeding flocks were found infected with *Salmonella* in the EU-25 MS. The levels of *Salmonella* infection in flocks of laying hen breeders ranged up to 33%, and in flocks of broiler breeders up to 37%, in the MS providing data according to the Directive.

In flocks of laying hens the levels of infection in the different MS ranged from 0 to 32.2% and in flocks of broilers from 0 to 23.4%. Positive flocks were also frequently reported among flocks of turkeys, ducks and geese.

Few MS have active monitoring of *Salmonella* in pigs and cattle. The level of *Salmonella* in pig and cattle herds in the Nordic countries (Denmark, Finland, Norway and Sweden) remained low. In Italy the proportion of infected cattle herds was slightly higher and in The Netherlands, a relatively high proportion of the pig-fattening herds was infected.

Feedingstuffs

The occurrence of *Salmonella* in fishmeal decreased in most MS compared to previous years, whereas the overall levels of *Salmonella* in meat and bone meal and in compound feedingstuffs were comparable to previous years. The level of *Salmonella* contamination in feed of vegetable origin, mainly oil seeds and products thereof, varied considerably between MS. *Salmonella* Enteritidis and *S.* Typhimurium were detected in several types of feedingstuffs, however the levels were low.

Salmonella serovars

Overall, 86% of the isolates from human cases in the Community were serotyped. *Salmonella* Enteritidis and *S.* Typhimurium were the most commonly reported serovars from human infections, comprising 76% and 14% of the cases, respectively. Other serovars caused each 1% or less of the cases. Inclusion of the new MS increased the relative proportion of *S.* Enteritidis.

Salmonella Enteritidis was the most commonly occurring serovar isolated from broiler meat, followed by *S.* Infantis and *S.* Typhimurium. However, the predominance of specific serovars in broiler meat varied greatly between the MS.

Generally, table eggs are not monitored using culture methods. The data available from two MS showed that *S.* Enteritidis was also the predominating serovar reported in table eggs. The dominant serovars isolated from flocks of laying hens and broilers were *S.* Enteritidis, *S.* Infantis and *S.* Typhimurium. However, the distribution of specific serovars varied greatly between the MS. *Salmonella* Typhimurium was the predominating serovar isolated from pigs and pig meat followed by *S.* Derby. Compared to 2003, the occurrence of S. Infantis in pig meat has increased.

Several MS provided serovar information for bovine meat in 2004, but the monitoring data was too sparse for a Community evaluation of the serovar distribution. In cattle, *S.* Typhimurium and *S.* Dublin were the most frequently detected serovars during monitoring in 2004.

Antimicrobial resistance

From almost all countries, data was provided on antimicrobial resistance in *Salmonella* isolates from humans, various animal species and food of animal origin. Resistance to ampicillin, streptomycin, tetracycline and sulphonamide was common in *Salmonella* isolates from humans. Most MS also reported resistance to nalidixic acid, which is an indicator of emerging resistance to fluoroquinolones. Among isolates from meat, resistance to ampicillin, nalidixic acid, streptomycin, tetracycline was common. Resistance to nalidixic acid occurred especially in broiler and poultry meat, whereas resistance to fluoroquinolones was uncommon. Several MS reported high levels of resistance to ampicillin, streptomycin, tetracycline and sulphonamide in *Salmonella* from production animals. With some exceptions, resistance to nalidixic acid as well as fluoroquinolones was low. Large variation in the occurrence of antimicrobial resistance among MS was evident.

Campylobacter

Humans

A total of 183,961 human cases of campylobacteriosis were reported from 21 MS in 2004. The Community incidence was 47.6 cases per 100,000 population, ranging from 0.1 to 249.6 in the reporting MS. By far the most common species reported was *C. jejuni* followed by *C. coli.*

The Community incidence increased by 32% from 2003. In all old MS except Spain and Sweden, an increasing national trend was observed. The new and old MS generally reported incidences within the same range with the exception of Czech Republic, who reported the highest incidence of human campylobacteriosis in the EU.

Foodstuffs

Food of poultry origin is the commodity most intensively sampled, and also where the majority of positive findings of *Campylobacter* in food occur. In meat, the highest prevalence (>80%) was reported in poultry meat at slaughter. At retail *Campylobacter* was reported in poultry meat in a range of 8.1% to 77%. Prevalences in pig meat and bovine meat at slaughter were considerably lower, ranging from no findings to 11.9%. *Campylobacter* were also isolated from a variety of other foodstuffs such as fishery products, cheeses and vegetables.

Animals

The vast majority of the reported data on broiler flocks were from the Nordic countries, where the prevalence ranged from 3.1% to 27.0%, decreasing in all Nordic countries from 2003 to 2004. In all MS, the *Campylobacter* positive samples from poultry, pigs and cattle were generally high, ranging up to 91.0%, 79.6% and 64.2%, respectively. The most common *Campylobacter* species isolated from poultry and poultry meat was *C. jejuni*. In pigs and cattle either *C. jejuni* or *C. coli* predominated.

Voluntary or mandatory control programmes on *Campylobacter* in broilers exist in 6 MS and Norway. The control programmes have common traits, e.g. ensuring a high level of biosecurity in the flocks and logistic slaughter (slaughtering positive flocks at the end of the day). Furthermore, carcasses from positive flocks may be frozen or subjected to heat treatment.

Antimicrobial resistance

With few exceptions, 20-50% of all *Campylobacter* spp. isolates from humans reported by the MS were resistant to fluoroquinolones, tetracyclines, quinolones and penicillins, whereas resistance to macrolides was generally at a low level. In isolates from animals and meat resistance to streptomycin, fluoroquinolones, ampicillin and tetracycline was common, except in isolates from the Nordic countries. Furthermore, resistance to other antimicrobials, e.g. macrolides, varied between countries. In some MS the vast majority of *Campylobacter* isolates from poultry, pigs and sheep were resistant to quinolones and fluoroquinolones. In some MS, the use of fluoroquinolones in food animals has been restricted in order to prevent emergence and spread of fluoroquinolone resistance.

Listeria monocytogenes

Humans

A total of 1,267 cases of listeriosis was reported from 21 MS in 2004. The reported incidence in EU in 2004 was 0.3 cases per 100,000 population which is similar to 2003. However, in countries with several years of data the incidence of listeriosis has increased when compared with the previous five years. Listeriosis is mainly reported to occur among adults and elderly people. A total of 107 deaths due listeriosis was recorded. All new MS reported a listeriosis incidence below the overall EU incidence in 2004.

Foodstuffs

Testing for *Listeria monocytogenes* in various types of foodstuffs was reported from 21 MS and Norway covering mainly ready-to-eat foods. *L. monocytogenes* was isolated from many types of foodstuffs. Qualitative results varied considerably, and significant findings above the critical contamination level (100 bacteria/g) were most commonly reported from fishery products, and occasionally from meat products, cheeses and some ready-to-eat meat products.

Animals

Clinical listeriosis was reported only from Sweden and mainly in sheep.

Verotoxigenic Escherichia coli (VTEC)

Humans

A total of 4,143 cases of VTEC infections was reported from 17 MS in 2004. The incidence in EU was 1.3 cases per 100,000 population. The overall number of human cases reported increased compared to 2003. The majority of this increase was reported by the Czech Republic, who contributed with 42% of the total number of cases. By comparing only those MS who reported data for both years, the total number actually decreased by 3% from 2003 to 2004. The number of cases of HUS syndrome caused by VTEC remained similar to that reported in 2003. The percent of cases caused by the VTEC serotype O157 ranged widely, but in 6 countries serotype O157 constituted more than two thirds of the subtyped isolates.

Foodstuffs

A total of 18 MS and Norway reported data on the occurrence of VTEC in foodstuffs. The majority of the positive samples were from raw milk and bovine meat. However, several MS also reported VTEC from pig, poultry and sheep meat, and some fishery products. The variation in sample size and in type and quality of data did not justify comparisons between countries.

Animals

VTEC was detected in several animal species. The majority of positive samples were from cattle, indicating that cattle serve as an important reservoir for human exposure to VTEC. Positive findings were also reported from goats and sheep, pigs and poultry. Information on pathogenicity factors of the isolated VTEC strains was not provided.

Tuberculosis due Mycobacterium bovis

Humans

The notification systems for human tuberculosis does not always distinguish the cases caused by different species of *Mycobacterium* or only a subset of the isolates were speciated. Thus, a specific Community incidence for human *M. bovis* infections and an overall trend cannot be estimated. In 2004 the total number of reported human cases (86) was higher than in 2003 due to inclusion of data from Germany.

Animals

Ten MS and Norway had an Officially Tuberculosis Free (OTF) status in 2004. Most of the new MS do not yet have OTF status according to the EU legislation, but the level of *M. bovis* in cattle herds was relatively low in these countries. The risk of contracting domestic tuberculosis from animals in the OTF Member States as well as in the new MS is assumed to be extremely low, and domestic cases in these countries are usually reactivations of pre-existing infections in elderly or immunocompromised persons or infections in immigrants. No OTF MS reported contact with animals or food to be the suspected source of infection.

Bovine tuberculosis was detected in few cattle herds in two of the 10 OTF MS. All the old non-OTF MS run eradication programmes against bovine tuberculosis and in most of the countries there has been a decrease in the proportion of infected herds since 2001. In 2004, the proportion of infected herds was generally below 2% in these non-OTF old MS.

Few MS reported isolation of *M. bovis* from sheep, goats, pigs or wildlife (deer, wild boars and badgers).

Brucella

Humans

A total of 1,337 cases of brucellosis were reported from 21 MS in 2004. The estimated Community incidence (EU-25) was 0.4 cases per 100,000 population. Overall, the human incidence of brucellosis in the EU-15 MS decreased from 1999 to 2003, and remained at the same level in 2004. During recent years, the highest incidences of human brucellosis have been recorded in the Mediterranean MS, and cases have primarily been caused by *B. melitensis*. Over the last five years, implementation of brucellosis eradication programmes has occurred, and a concurrent reduction of human brucellosis was observed in these MS.

Foodstuffs

Few Member States reported testing of foodstuff (milk and milk products), for *Brucella*. Isolations were only from raw milk from Italy.

Animals

By the end of 2004, 9 MS, regions in three other MS, and Norway were officially free of brucellosis in cattle (OBF) as well as officially free from brucellosis *(B. melitensis)* in sheep and goats (ObmF). Four MS and regions in three other MS were officially free from brucellosis in sheep and goats alone. Regions in Italy were OBF alone. In 2004, no herds positive for brucellosis was detected in the OBF or ObmF MS, but some herds tested positive in the officially free regions of the other MS.

In the old non-OBF and non-ObmF MS no clear general trends were obvious and the overall occurrence of brucellosis among cattle, sheep and goat in the EU-15 MS remained approximately at the same level as in 2003. The proportion of infected herds was generally less than 1% in cattle and less than 4% in ovine and caprine herds in the old non-free MS.

Most of the new MS have not obtained the OBF/ObmF status according to the EU legislation in 2004, even though brucellosis has been eradicated or was never registered in many of these MS. Compared to the old MS without OBF/ObmF status, human incidence and prevalence of brucellosis among cattle, sheep and goat herds was lower in the new MS without OBF/ObmF status.

Yersinia

Humans

Twenty MS reported a total of 10,381 cases of human yersiniosis in 2004, where two thirds of the cases were reported from Germany. The overall EU-25 incidence was 2.4 cases per 100,000 population. There has been no clear trend in the total number of cases reported within the EU from 2000 to 2004. But an increasing trend was observed in nine MS that reported and had notification throughout the period. The most common subtype of *Yersinia* isolated from human cases was *Y. enterocolitica*, and mainly serotype O:3.

Foodstuffs

The majority of the 9 MS reporting data on *Yersinia* in foodstuffs report data from fresh pig meat, and several on milk and dairy products, bovine meat and poultry meat as well. The occurrence of *Yersinia* in pig meat and bovine meat appears to be quite similar, and higher than the occurrence observed for other food sources.

Animals

Few MS report isolation of *Yersinia* in animals. The bacteria was frequently found in pigs and cattle.

Trichinella

Humans

All MS and Norway included information about *Trichinella* in the national reports for 2004. A total of 270 cases of human trichinellosis was reported from 9 MS in the EU in 2004. The incidence was 0.06 cases per 100,000 population. This was a three-fold increase compared to 2003, and was mainly due to the inclusion of a high number of cases from Poland. For the EU-15 countries, there has been no clear trend in the number of cases over the last 6 years. As in previous years, the MS generally reported all or the majority of human sporadic cases and outbreaks to result from private import of meat or consumption abroad of meat not examined for *Trichinella*.

Animals

Pigs, horses, wild boars and carnivorous game are tested for *Trichinella* at slaughter. High numbers of meat samples from domestic pigs and horses were examined in the context of meat inspection by the MS. *Trichinella* was not detected in horses, and was detected in few samples from domestic pigs from a limited number of MS. A much higher prevalence of *Trichinella* was observed in the wildlife population, including wild boars, compared to the domestic animals, indicating that the wildlife serves as a reservoir for the parasite. *Trichinella* was primarily detected in animals in North-Eastern Europe and few other MS. A number of the new MS were among the countries with highest infection rates.

Echinococcus

Humans

A total of 343 human cases caused by *Echinococcus* spp. was reported from 19 MS in 2004, of which 2 MS reported no cases in 2004. The incidence was 0.1 case per 100,000 population. At least 57% of the cases were caused by *E. granulosus*. No clear trend was observed in the overall number of human cases over the last 6 years. The number of human cases decreased from 2003 to 2004 by approximately 20% in the 17 MS that reported in both years. The reduction may be attributed to a significant decrease of the number of cases reported from Spain. If Spain is removed from the calculation, there was an overall increase in the number of reported human cases. The largest increases were observed in Portugal and Lithuania.

Animals

The majority of positive findings in farm animals were reported from the Mediterranean MS. Most of these MS reported a decreasing trend in the number of positive findings over the last five years. The other old MS (EU-15) reported either no findings or very low prevalences. Five new MS (EU-10) reported data on the occurrence of *Echinococcus*. High prevalences were reported in sheep and goats in Poland.

E. multilocularis, the cause of alveolar echinococcosis in humans, was reported found in foxes in five MS and in wild boars in France. *E. granulosus* was found in other wildlife such as moose, reindeer and wolves.

Toxoplasma

Humans

Eighteen MS reported a total of 1,736 cases of human toxoplasmosis in 2004, of which 45 cases were registered to be congenital infections. The EU incidence was 0.6 cases per 100,000 population. Since some EU-15 countries only notify subsets of the cases, this must be considered an underestimation. Only few MS have a routine surveillance for toxoplasmosis in pregnant women or newborns. Overall an increasing number of cases were reported from 2000 to 2004 following a parallel increase in the number of MS reporting human cases. The reported incidence was considerably higher in the new MS (EU-10) than in the old MS (EU-15).

Several MS report that they provide advice to women on how to prevent *Toxoplasma* infections during pregnancy.

Animals

Data on toxoplasmosis from animals in 2004 were mainly results from diagnostics. *Toxoplasma* was diagnosed in all animal species examined: cattle, sheep, goats, pigs, solipeds, dogs, cats and pigeons. In general the focus of toxoplasmosis in animals is on *T. gondii* as an important causative agent for abortions in sheep and goats rather than the food safety aspect.

Cysticerci and Sarcocystis

Belgium was the only Member State to report data on cysticercus *(Taenia saginata)* and sarcocystis in 2004. Only data from visual post mortem inspection of bovine carcasses at slaughterhouses was reported. Cysticercus was detected in 0.34% of 881,535 carcasses. More than 99% of the infected carcasses were infected at a low level. Sarcocystic lesions were detected in 19 carcasses (0.002%). Infected carcasses were destroyed. The proportion of carcasses infected with these parasites did not change significantly from 2003 to 2004.

Rabies

Humans

In 2004, information on rabies was provided from all MS and Norway. Since 2001, only five human cases, all imported from countries outside EU, were reported. In 2004, two imported human case of rabies was reported from Austria and Germany.

Animals

In 2004, twelve MS reported rabies cases in domestic animals, pet animals or wildlife, and the number of cases decreased to 1,683 compared to 2,130 cases in 2003. Forty-four percent of the animal cases in 2004 were in foxes. In most EU-15 Member States, cases reported from animals are very rare or have been absent for many years. The majority of rabies cases in domestic animals and pet animals were reported by the new MS, where wildlife (especially foxes) were frequently infected and constitutes a reservoir for infection of domestic animals. All MS with positive findings have eradication programmes in action or will begin eradication programmes in 2005.

Antimicrobial resistance in E. coli indicators

A total of eighteen MS and Norway provided data on antimicrobial resistance in *E. coli* indicators in 2004. Data were generated through monitoring programmes. Low levels of antimicrobial resistance were reported for isolates from food (only 4 MS reported data). A large variation in the prevalence of resistance in *E. coli* indicators isolates from animals (cattle, pigs and *Gallus gallus*) was observed. The Nordic countries reported a relatively low prevalence of resistance to penicillins, quinolones and tetracyclines, as compared to other EU countries. In general, the highest prevalence of resistance was reported in isolates from *Gallus gallus*, followed by isolates from pigs and cattle.

Foodborne outbreaks

Analysing and evaluation of reported data on foodborne disease outbreaks was presented more extensively in 2004 than in previous years. Data was received from 20 MS and Norway. All new MS, except Cyprus and Malta, reported outbreaks in 2004. The data received was generally complete and of a high quality. However, the data differed between MS and some MS, particularly the most populous, provided aggregated data for outbreaks. This meant that details on settings and sources of outbreaks were not available for the majority of outbreaks. Some MS only reported the number of hospitalised cases, leading to some overestimation of the hospitalisation rates.

Fourteen MS and Norway provided information on their outbreak reporting systems. All MS reported systems of national data collection through centralised reporting and most MS had mandatory reporting systems. Many MS indicated that outbreaks are under-reported.

A total of 6,860 outbreaks were reported in EU in 2004 affecting 42,447 persons of which 9.8% were hospitalised. Thirteen deaths were reported from outbreaks. Czech Republic and Germany reported the largest number of outbreaks, 2,334 and 2,647 respectively, representing 72.6% of all outbreaks reported for 2004.

The most common cause of outbreaks in the EU in 2004 was *Salmonella*, causing the largest number of outbreaks (73.9% of the reported outbreaks) and by far the largest number of persons involved (68.9%). The hospitalisation rate was 10.8%. *Salmonella* outbreaks were reported in all 20 MS that provided data on outbreaks and in Norway. *S.* Enteritidis and *S.* Typhimurium were the predominant serotype associated with outbreaks where the serotype was reported. Eggs, bakery products and meat products were the most important sources, and in approximately 50% of the outbreaks exposure took place in private homes or restaurants.

Czech Republic reported proportionally more *Salmonella* outbreaks than any other country. Most were family outbreaks. The largest single outbreak of *S.* Enteritidis was reported from Greece resulting in 651 ill persons, with 247 hospitalisations and one death, with dry fruits and nuts identified as source.

The second most common cause of outbreaks in 2004 was *Campylobacter*. A total of 1,243 outbreaks (18% of outbreaks) was caused by *Campylobacter*. The outbreaks involved 3,749 persons of which 4.2% were hospitalised. Outbreaks of campylobacteriosis were reported by 13 MS and Norway and *C. jejuni* was by far the species most commonly reported in outbreaks where speciation was reported. The majority of *Campylobacter* outbreaks, with a known source, were associated with broiler meat or water.

Other major causes of foodborne outbreaks in the EU were pathogenic *E. coli* (1.3% of the outbreaks), foodborne viruses (1.3%) and *Yersinia* spp. (0.7%). Finland reported a large outbreak of *Y. pseudotuberculosis* (131 cases), where the source was grated carrots. Also outbreaks caused by staphylococcal enterotoxins, *Cl. botulinum, Cl. perfringens*, histamine and marine biotoxins were reported.

Only a few foodborne outbreaks caused by parasites were reported. Outbreaks caused by *Trichinella*, were reported by the Lithuania and Poland, the latter reporting four outbreaks involving a total of 157 persons. The sources of these outbreaks were pig or wild boar meat. The largest outbreak reported in 2004 was reported by Norway, involving 1,300 people infected with *Giardia* by drinking contaminated water.

Table 1. Overview of the existence of notification systems for human zoonotic diseases in the Member States, 2004.

	A	B	CY	CZ	DK	EST	FIN	F	D	GR	H	IRL	I	LV	LT	L	M	N	PL	P	SK	SLO	ES	S	NL	UK
Salmonellosis	Y[1]	Y[2]	Y	-	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	-	-	Y	-	Y	Y	Y	Y[3]	Y	N	-
Campylobacteriosis	Y[1]	Y	Y	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y	-	-	Y	-	-	Y	Y	Y[3]	Y	N	N
Listeriosis	Y	Y[4]	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	-	Y	Y	Y	Y	Y	Y	Y[3]	Y	N	N
VTEC	Y[1]	Y	-	Y	Y	Y	Y	N	Y	Y[5]	Y	Y[5]	Y	Y	Y	-	-	Y	-	-	Y	Y	Y[3]	Y	Y	N
Tuberculosis	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	-	-	Y	-	Y	Y	Y	Y[3]	Y	Y	Y
Brucellosis	Y	Y	Y	Y	N[6]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	-	-	Y	Y	Y	Y	Y	Y	Y	Y	Y[7,8]
Yersiniosis	Y	Y[4]	-	Y	Y	Y	Y	N	Y	-	Y	Y	Y	Y	Y	-	-	Y	-	-	Y	Y	Y[3]	Y	N	N
Trichinellosis	Y	Y[4]	N	Y	N	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	-	-	Y	Y	Y	Y	Y	Y	Y	Y	N
Echinococcosis	Y	Y	-	Y	N	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	-	-	Y	-	Y	Y	Y	Y	Y	N	N
Toxoplasmosis	N	Y[2]	N	Y	N	Y	Y	N	Y[9]	Y[9]	Y	Y	Y	Y	Y[9]	-	-	Y[11]	-	-	N	Y	Y[3]	N	N	Y[10]
Rabies	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	-	-	Y	-	-	Y	Y	Y	Y	Y	Y

Y=yes, N=no, - = no information
1. In Austria, clinical cases notifiable since 1996.
2. In Belgium, in the French Community.
3. In Spain, only hospitalised cases notifiable.
4. In Belgium, in the Flemish Community.
5. In Greece and Ireland, EHEC is notifiable.
6. In Denmark, only imported cases registered.
7. In United Kingdom, imported or laboratory infected cases occur.
8. In United Kingdom, reportable to all work related activities but not to all incidents.
9. In Germany, Greece and Lithuania, congenital cases only.
10. In United Kingdom, only Scotland.
11. In Norway, encephalitis cases are notifiable.

2.2. Focus of the year

The ten new MS, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia and Slovenia, reported for the first time on a mandatory basis in 2004. These new MS reported data for most zoonoses. Data quality was good and additional information, including historical data, was included in written reports. The occurrence of disease and results from monitoring and surveillance programs in these countries is the focus of the Community Summary Report in 2004.

Czech Republic, Slovakia and Slovenia all report rates of human salmonellosis greater than 160 cases per 100,000 population, noticeably higher than the total EU incidence (42.2 per 100,000). With the exception of the Czech Republic, who reported the highest incidence of human campylobacteriosis, the rest of the new MS generally reported incidences of campylobacteriosis within ranges previously reported by the old MS. Listeriosis reported by new MS represented only 4.7% of all cases reported, and all new MS reported incidences below the total EU incidence. The majority of the increase in total number of human VTEC cases was reported by the Czech Republic, who contributed with 42% of the total number of cases. Latvia, Lithuania and Poland reported also significant numbers of trichinellosis cases, which increased the total number of trichinellosis cases in EU-25 by three fold. The incidence of toxoplasmosis in new MS was higher than the incidence in EU-15. Czech Republic and Poland reported the most of these cases.

Food-borne outbreaks were reported by eight new MS. The Czech Republic reported proportionally more outbreaks than any other MS in the EU, predominantly caused by *Salmonella*. The Czech Republic reported also 547 *Campylobacter* outbreaks (44% of the outbreaks) affecting 1,555 people with 90 hospitalisations. Hungary reported one large waterborne outbreak of campylobacteriosis. Lithuania and Poland recorded together 8 outbreaks of trichinellosis.

With few exceptions, levels of *Salmonella* contamination in new MS that reported testing for in food, were similar to that of the old MS. Some higher prevalences were reported by Malta in fresh pig meat at slaughter (32.8% *Salmonella* positive) and by Cyprus in fresh broiler meat at processing (36.6% positive). New MS also reported testing for *Campylobacter* in food, particularly in poultry meat. Considerable prevalences (30-40%) were recorded by the Czech Republic, Slovenia and Cyprus.

Testing for *Listeria monocytogenes* in food was performed in all new MS across a variety of foods. The level of contamination was in general similar to the level in the old MS, although Estonia found 22.9% samples of fishery products positive for *L. monocytogenes*.

Seven new MS reported testing for VTEC in food. Cyprus, Estonia and Slovenia did not detect any VTEC from the samples tested. Poland reported 8.3% of bovine meat samples were positive and Latvia reported 4.9% of pigs tested were positive.

The new MS reported lower incidence of brucellosis in humans and animals compared to the old MS. This also applies to tuberculosis in cattle. Many of the new MS are seeking to receive an officially free status regarding these diseases in accordance with the EU legislation.

The new MS reported the majority of rabies cases in animals, where wildlife (especially foxes) were frequently infected. Estonia, Hungary, Latvia, Lithuania, Poland and Slovakia reported cases both in farm animals, pets and wildlife.

Some new Member States reported findings of parasites from slaughter animals. Lithuania, Poland and Slovakia found *Trichinella* in slaughter pigs, and Poland reported remarkable high *Echinococcus* findings in sheep, goats and pigs.

Data on antimicrobial resistance, primarily in *Salmonella* from humans, food and animals, was received from eight new MS: Czech Republic, Estonia, Hungary, Lithuania, Latvia, Poland, Slovakia and Slovenia. In general, the prevalence of antimicrobial resistance reported by new MS was similar to, or lower than, the prevalence reported by old MS. However, in many cases the reporting was based on a low number of samples, making comparison of prevalence between MS less valid.

In coming years the Community Report will benefit from continued contribution by the new MS and trend analysis will be possible in future reports.

2.3. General conclusions

The Member States and Norway reported human cases of all the zoonoses covered by the reporting system. Findings of the zoonotic agents were reported from a variety of food categories and animal species.

Salmonella and *Campylobacter* are currently the leading causes of foodborne bacterial gastroenteritis in the European Community. The reported incidences of human salmonellosis and campylobacteriosis in EU were almost at the same level in 2004.

Despite many efforts to prevent and control *Salmonella* Enteritidis, this pathogen continues to be a major cause of gastrointestinal disease in the EU. Especially the new MS reported high incidences of *S.* Enteritidis infections in 2004, whereas decreasing trends are observed in several of the EU-15. It is generally accepted, that infections caused by *S.* Enteritidis are related to poultry (*Gallus gallus*) products and especially table eggs and egg products. This is supported by the fact that the majority of reported *Salmonella* outbreaks in the EU-25 were caused by *S.* Enteritidis in eggs and egg products. It is also notable that those MS having the lowest proportions of *S.* Enteritidis cases have control programmes running not only in the breeding flocks in egg production line, but also in the laying hen flocks producing table eggs, which includes restrictions such as heat treatment of table eggs from flocks suspected of being infected.

Poultry, in particular broiler meat, is regarded the single most important source of human campylobacteriosis although other sources exist. Results from the monitoring of broiler flocks and broiler meat in 2004 support this. Some countries have taken initiatives to actively control *Campylobacter* in the broiler production chain. In the primary production control is particularly aimed at improving bio-security, and there appears to be some effect of these efforts, as indicated by a decreasing level of positive broiler flocks. At the slaughterhouse level, control efforts are mainly focused towards sorting of the positive and negative flocks and diverting the positive flocks for either freezing or heat treatment. Until now, only slight decreases in the incidence of human campylobacteriosis has been reported from these countries since the strategies were introduced. Continued research aiming at identifying new and more effective intervention strategies to further reduce the burden of human campylobacteriosis is therefore essential.

Twenty-four MS and Norway submitted data on antimicrobial resistance in isolates of *Salmonella*, *Campylobacter* and *E. coli* indicators from humans, various animal species and food of animal origin. In general resistance to ampicillin, streptomycin, tetracycline and sulfonamide was commonly reported. Most MS reported resistance to nalidixic acid, which is an indicator of emerging resistance to fluoroquinolones. In general, large variation between MS was evident. The reporting of antimicrobial resistance in the MS, clearly demonstrates the presence of a reservoir of antimicrobial resistance in food animals and food of animal origin. Emergence of infections in humans, caused by resistant bacteria, originating from the animal reservoir, is a concern as effective treatment may be compromised.

While *Campylobacter* and *Salmonella* infections are the most frequently occurring zoonotic diseases, listeriosis and VTEC infections are the most severe zoonotic illnesses due to the high morbidity and mortality in vulnerable populations and in children.

Occurrence of *Listeria monocytogenes* is of particular concern in ready-to-eat and moderately preserved food because of its ability to grow at low temperatures. *L. monocytogenes* was reported in relatively high proportions from fishery products, cheeses made from raw milk and some ready-to-eat meat products in 2004. Such products may constitute a risk for humans.

VTEC is characterised as an emerging disease in many countries, and is notorious for causing outbreaks. The incidence in EU in 2004 was similar to the incidence in 2003 and considerably lower than the incidence of salmonellosis and campylobacteriosis. VTEC infection may be associated with severe complications such as haemolytic uraemic syndrome (HUS) causing renal failure and destruction of the red blood cells particularly in children and the elderly. Farm animal species (in particular cattle) are regarded as reservoir of VTEC, and food of animal origin is considered to be the main sources of human foodborne infections. This is supported by the results testing of animals and foodstuffs in 2004. The overall proportion of positive samples in foodstuffs was low though – below 1%.

Yersinia spp. caused relatively high number of human cases in 2004, and there is an increasing trend among the countries, which have reported consistently over the 5 years. *Yersinia* was frequently reported in pigs, cattle and meat thereof, implicating that they may form the main source of the infections.

Overall, the “classical” zoonoses: tuberculosis, brucellosis, and trichinellosis, as well as rabies, and echinococcosis are very rare diseases in EU. For tuberculosis caused by *Mycobacterium bovis* and brucellosis, the low numbers of reported cases indicate that the programmes for eradicating these diseases in the primary production are successful. Effective control programmes have been run also for rabies and echinococcosis in farm and wild animals.

As in previous years, the vast majority of human cases caused by *Trichinella* was reported to result from private import of meat or consumption abroad of non-tested meat. Large numbers of samples from domestic pigs and horses are examined annually. In 2004, *Trichinella* was only detected in few samples from domestic pigs. In contrast, a much higher prevalence was observed in the wildlife population, including wild boars, indicating that wildlife may constitute a risk for infection of domestic animals reared in proximity to a wildlife reservoir. Wildlife forms a reservoir also for rabies and *Echinococcus* infections.

Ten new MS reported for the first time on a mandatory basis in 2004. Most zoonoses were covered and data quality was good. The EU incidences of human campylobacteriosis, salmonellosis and trichinellosis have all increased with the inclusion of the new MS. However, it is not clear whether the higher incidences reported for these diseases are reflecting true differences or are a result of more intensive surveillance and reporting.

3. INFORMATION ON SPECIFIC ZOONOSES

3.1. Salmonella

Salmonella has long been recognised as an important zoonotic pathogen of economic significance in animals and humans. Next to *Campylobacter*, it is the most reported foodborne zoonotic pathogen in the EU. The genus *Salmonella* is currently divided into two species: *S. enterica* and *S. bongori. S. enterica* is further divided into six subspecies and most *Salmonella* belong to the subspecies *S. enterica* subsp. *enterica*. Members of this subspecies have usually been named based on where the serovar or serotype was first isolated. In the following text, the organisms are identified by genus followed by serovar, e.g. *S.* Typhimurium. More than 2,400 serovars of zoonotic *Salmonella* exist and the prevalence of the different serovars changes over time.

Human salmonellosis is usually characterised by acute onset of fever, abdominal pain, nausea, and sometimes vomiting. Symptoms are usually mild and most infections are self-limiting, lasting a few days. However, in some patients, the infection may be more serious and the associated dehydration can become life threatening. In these cases, as well as when *Salmonella* causes bloodstream infection, effective antimicrobials are essential for treatment. Salmonellosis has also been associated with long-term and sometimes chronic sequelae e.g. reactive arthritis.

There are numerous foodborne sources of *Salmonella* including a wide range of domestic and wild animals and variety of foodstuffs. Transmission often occurs when organisms are introduced in food preparation areas and are allowed to multiply in food e.g. due to inadequate storage temperatures, or because of inadequate cooking or cross contamination of cooked food. The organism may also be transmitted through direct contact with infected animals and faecally contaminated environments.

Overall, in EU *S.* Enteritidis and *S.* Typhimurium are the serovars most frequently associated with human illness. Human *S.* Enteritidis cases are most commonly associated with consumption of contaminated broiler meat and eggs, while *S.* Typhimurium cases are associated with consumption of contaminated pig, poultry and bovine meat, dairy products, and lamb.

In animals, sub-clinical infections are common. The organism may easily spread between animals in a herd or flock without detection and animals may become intermittent or persistent carriers. Infected cows may succumb to fever, diarrhoea and abortion. Within calf herds, *Salmonella* may cause outbreaks of diarrhoea with high mortality. Fever and diarrhoea are less common in pigs than in cattle, and sheep, goats and poultry usually show no signs of infection.

3.1.1. Salmonellosis in humans

In 2004, all MS (except Luxembourg who did not provide data), reported cases of salmonellosis. Data reported here include all MS and Norway. There were 192,703 cases of salmonellosis in the EU, which represents an incidence of 42.2 per 100,000 population. This is an increase of 22% when compared with EU-15 2003 and the highest incidence since 1999 (Table SA1). Incidence ranged from 6.6 per 100,000 population in Portugal to 300.9 per 100,000 population in Czech Republic.

Table SA1. Number of human cases of salmonellosis 1999-2004 and incidences in 2004[1]

	2004 Cases/ 100,000 population	2004	2003	2002	2001	2000	1999
		Number of cases					
Austria	89.5	7,286 (188)	8,251	8,322	7,219	7,017	7,058
Belgium	91.8	9,545	12,894	9,754	10,784	14,047	15,569
Cyprus	12.2	89	73	-	-	-	-
Czech Republic	300.9	30,724 (248)	-	-	-	-	-
Denmark	28.5	1,538	1,713	2,075	2,918	2,308	3,268
Estonia	10.0	135 (4)	-	-	-	-	-
Finland	43.1	2,248 (1788)	2,290	2,357	2,731	2,624	2,789
France	10.6	6,352	6,199	6,575	7,456	7,684	8,184
Germany	69.0	56,947 (1071)	63,044	72,377	77,386	79,535	85,146
Greece	13.5	1,493	837	460	284	206	221
Hungary	74.7	7,557	-	-	-	11,507	-
Ireland	10.2	410 (68)	449	369	430	640	956
Italy	11.6	6,696	6,352	10,744	8,215	5,765	7,943
Latvia	22.4	520 (6)	799	-	-	-	-
Lithuania	53.8	1,854	1,161	-	-	-	-
Luxembourg	-	-	421	528	319	-	353
Malta	19.8	79 (2)	-	-	-	-	-
Poland	41.8	15,958	-	-	-	-	-
Portugal	6.6	691	720	330	696	309	424
Slovakia	235.4	12,667 (43)	-	-	-	-	-
Slovenia	162.6	3,247	3,980	-	-	-	-
Spain[2]	16.8	7,109	8,558	8,047	7,968	6,366	5,954
Sweden	39.7	3,562 (2709)	3,794	3,892	4,508	4,617	4,884
The Netherlands	9.4	1,520 (293)	2,142	1,588	2,082	2,059	2,128
United Kingdom	24.3	14,476 (248)	16,343	16,318	18,419	16,988	19,819
EU-Total	**42.2**	**192,703**	**140,020**	**143,736**	**151,415**	**161,672**	**164,696**
Norway	34.2	1,567 (1134)	1,539	1,495	1,899	1,489	-

Note: Figures in brackets are reported imported cases, values are included in the total number of cases.
1. EU-Total incidence is based on population in reporting countries.
2. In Spain, only hospitalised cases notifiable.

The reported increase in incidence in 2004 is due to the higher incidence of salmonellosis in new MS reporting for the first time. The Czech Republic and Slovakia report rates greater than 200 per 100,000 population. Trend data is not available for new MS as this is their first year of reporting.

For those MS where data was available for the last five years, and salmonellosis is notifiable, the reported number of cases in 2004 was compared to the mean of the previous five years (Figure SA1). In seven of the nine MS with available trend data, a decreasing five-year trend was observed, whereas Portugal and Greece experienced an increasing trend. Explanations were not provided for these increases. Norway remained at a low steady state throughout the period.

Figure SA1. Percent change in incidence of human salmonellosis in countries with available data and where salmonellosis is notifiable. Reported number of cases in 2004 compared to a five-year mean (1999-2003)

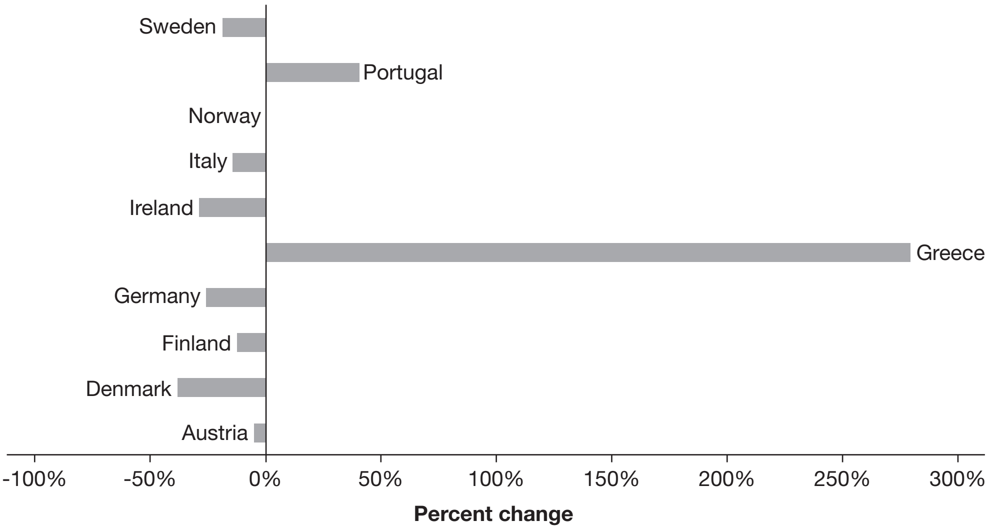


Table SA2. Number of reported domestic and imported human cases of salmonellosis by serovar, 2004

	Domestic			Imported		
	***S.* Ent**[1]	***S.* Typ**[2]	***S.* spp.**[3]	***S.* Ent**[1]	***S.* Typ**[2]	***S.* spp.**[3]
Czech Republic	29,595	448	433	167	9	72
Estonia	87	18	26	4	0	0
Finland	78	125	118	738	177	873
Germany	31,641	10,007	7,314	2,328	326	1,071
Ireland	135	115	92	38	9	21
Latvia	420	23	54	3	-	3
Malta	44	10	23	1	0	1
Norway	80	83	182	693	101	340
Slovakia	11,192	152	1,278	29	1	13
Sweden	75	193	229	1,209	180	1,320
The Netherlands	665	449	319	103	14	176
United Kingdom	486	319	-	211	37	-

1. *S.* Enteritidis.
2. *S.* Typhimurium.
3. *S.* spp. includes cases with unknown serovar as well as all serovars other than *S.* Enteritidis and *S.* Typhimurium.

Some MS made a distinction between cases acquired within the country and cases acquired abroad (Table SA2). Of the MS reporting this data, most cases were acquired within the country and *S.* Enteritidis was the most common serotype. Finland, Sweden and Norway, however, reported a large proportion of cases as acquired outside the country. Sweden defines an imported case if the person has been abroad during the incubation period for salmonellosis.

Human Salmonella serovars

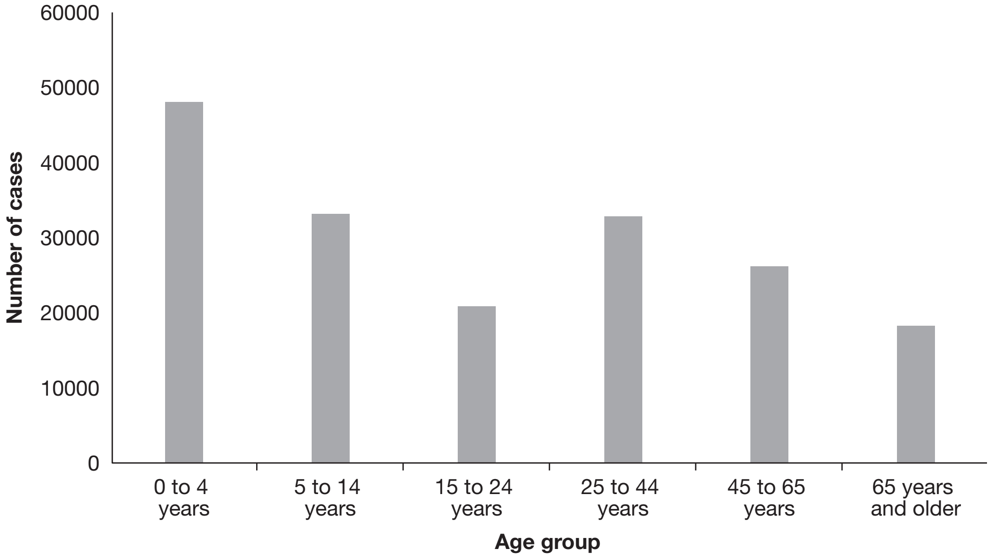
Data on *Salmonella* serovars was provided by 23 MS (Italy and Poland did not provide data) and Norway. (Table SAS1 in Section 3.1.5. provides detail.) *S.* Enteritidis is identified in 76% of *Salmonella* isolates that are serotyped. In general, MS report *S.* Enteritidis as their most prevalent serovar, ranging from 32% in France to 100% in Cyprus. This serovar is commonly associated the consumption of under-cooked eggs and poultry meat.

Salmonella Typhimurium was identified in 14% of all serotyped isolates. *S.* Typhimurium infections are associated with the consumption of contaminated animal products particularly pig, poultry and bovine meat. *S.* Typhimurium was the most common cause of domestic human cases in Sweden and Finland.

Age distribution

The greatest incidence of reported salmonellosis was in children aged 0-4 years (Figure SA2). This age group represented 26% of all cases of salmonellosis reported in the EU. A secondary peak occurs in adults aged 25-44 years. Data on age distribution in humans is summarised in Level 3, Table SA2-SA4.

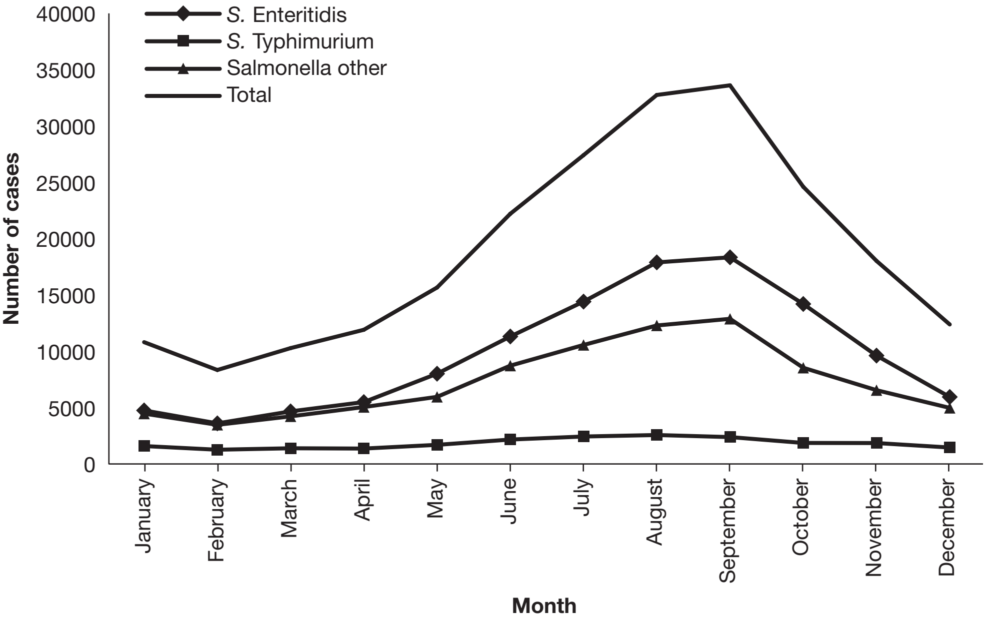
Figure SA2. Age distribution of cases of salmonellosis in EU and Norway, 2004



Seasonality

All MS provided data on the monthly distribution of salmonellosis. A peak in the incidence of salmonellosis is seen in late summer/autumn (Figure SA3). Data on seasonal distribution in humans is summarised in Level 3, Table SA5-SA7.

Figure SA3. Distribution of salmonellosis by month in EU and Norway, 2004



3.1.2. Salmonella in food

At this time no common scheme has been agreed upon for monitoring the occurrence of *Salmonella* in foodstuffs. As a consequence the sampling schemes and diagnostic methods, as well as the type of foodstuffs selected for analyses, vary between MS. As such, results are not directly comparable between MS and comparison between years within the same country should be done with caution. Only results based on more than 25 samples tested are addressed in the following. Details on the monitoring schemes applied in the MS are summarised in Appendix Tables SA9, SA12, SA18 and SA21.

Poultry meat and products thereof

A number of MS have applied monitoring schemes for *Salmonella* in poultry, these are described in Appendix Table SA7 and SA8. Data on the occurrence of *Salmonella* in broiler meat at different levels of the production line, in MS that have applied such programmes and that have reported consistently from 2000-2004 are presented in Table SA3 (slaughter and processing) and Figure SA4 (retail).

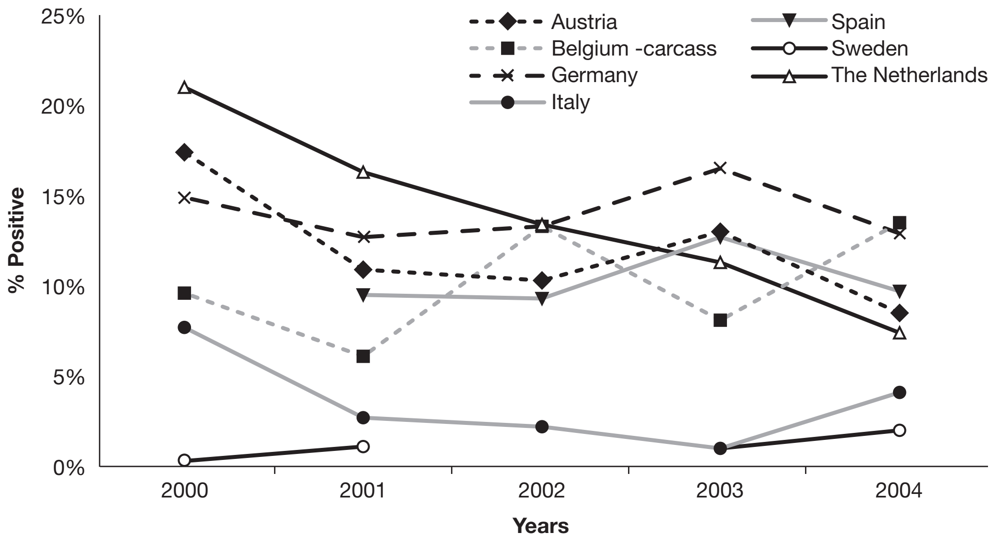
Poultry meat is a known source of human *Salmonella* infections. Denmark, Finland, Ireland, Sweden and Norway have had programmes for the control of *Salmonella* in broilers for a number of years and have reported data on *Salmonella* in broiler meat consistently. Sweden, Finland and Norway have consistently reported very low levels of Salmonella over the last 5 years. In Ireland there has been a decreasing trend for *Salmonella* findings in broiler meat at processing, from 9.3% in 2000 to 2.7% in 2004, see Table SA3.

Table SA3. *Salmonella* in poultry meat in countries with a monitoring/control programme[1], 2000-2004

	2004		2003		2002		2001		2000	
	N	% Pos	N	% Pos	N	% Pos	N	% Pos	N	% Pos
At slaughter										
Belgium[2]	-	-	189	17.5	171	9.4	222	12.2	170	8.8
Belgium[3]	-	-	57	24.6	72	23.6	120	25.8	116	31.9
Denmark	1,472	1.6	1,552[3]	5.0	1,667[3]	5.5	1,695[3]	4.1	4,543	2.9
Norway[4]	7,239[2]	1.0	7,183[2]	0	6,959[2]	0	7,135[2]	0	3,882	0
Greece	897	5.5	878	8.4	940	5.6	747	12.7	325	14.2
Italy	43	0	334	3.3	349	6.9	651	4.8	166	3.6
Spain	151	8.6	30	6.7	241	3.7	242	6.6	-	-
Sweden	3,730	0.1	4,209[2]	0	4,466[2]	0.1	4,243[2]	0	7,467	0
At processing/cutting plant										
Belgium	183[2]	8.7	148[5]	14.2	138[3]	16.7	150[3]	20.0	171	13.5
Finland	777	0.1	1,034	0.1	946	0.2	637	0.2	340	0
Ireland	6,955	2.7	1,869[6]	4.3	3,222	4.9	3,287	7.5	6,422	9.3
Italy	202	3.5	355[6]	2.3	1,100	2.0	243	1.2	399	2.0
Spain	141	2.1	168	18.5	288	5.6	93	8.6	-	-
Sweden	1,025	0	1,130	0	1,146	0	1,121	0		

1. Data are only presented for sample size >25 with positive findings.
2. Chicken carcasses (presence in 1g).
3. Layer carcasses (presence in 0.1g).
4. In Norway, neck-skin samples (presence in 5g).
5. Chicken breast (presence in 25g).
6. Official food control.

Figure SA4. ***Salmonella*** **in poultry meat at the retail level, from MS with monitoring and or control programmes and that have reported for most years in 2000-2004.**



Note: Data from Ireland have not been included due to sample sizes of less than 25, 2002-2004. Data from Sweden 2002 have not been shown since they these included samples of imported poultry meat (12%).

In 2000, *Salmonella* was detected in 7.7–21.0% of the samples collected at retail in the selected MS compared with 2004, where the observed ranges were lower: 4.1-13.5%. In The Netherlands a clear decrease in the proportion of *Salmonella* positive samples collected at retail was observed, from 21.0% in 2000 to 7.4% in 2004; a clear decreasing trend was also observed in Austria. In broiler carcasses sampled in Belgium, *Salmonella* was found in less than 15% of samples throughout the five-year period.

In 2004, approximately 27,000 samples of broiler meat were collected in 22 MS. Sample sizes and the type of product sampled varied among MS. Data for MS collecting 25 samples or more in 2004 with positive findings have been summarised in Table SA4. Eight MS provided data for broiler samples at slaughter and detected *Salmonella* in 0.1-26.8%, with the lowest level observed in Sweden and the highest in Malta.

At processing, sample-based *Salmonella* contamination levels ranged from 0.1% in Finland to 26.3% in cuts of broiler meat in Belgium (Table SA4). Although not directly comparable, the batch-based sampling in Cyprus, yielding 36.6% positive batches is indicative of a higher level of *Salmonella* contamination at processing in Cyprus than in the other reporting MS.

Table SA4. *Salmonella* in fresh broiler meat, sample based[1], unless otherwise stated, 2004

				S. spp.		*S.* Enteritidis		*S.* Typhimurium	
	N	Pos	% Pos	Pos	% Pos	Pos	% Pos	Pos	% Pos
At slaughter									
Denmark[2]	1,472	24	1.6	-	-	-	-	-	-
Greece	897	49	5.5	-	-	1	0.1	6	0.7
Latvia[2]	70	5	7.1	-	-	5	7.1	-	-
Malta	418	112	26.8	-	-	4	1.0	18	4.3
Poland	753	59	7.8	47	6.2	10	1.3	2	0.3
Slovenia	79	1	1.3	-	-	1	1.3	-	-
Spain	151	13	8.6	-	-	8	5.3	-	-
Sweden	3,730	2	0.1	-	-	-	-	2	0
At processing/cutting plant									
Belgium[3]	156	41	26.3	-	-	16	10.3	4	2.6
Belgium[4]	183	16	8.7	-	-	-	-	-	-
Cyprus[2]	134	49	36.6	4	3	3	2.2	1	0.8
Estonia	42	2	4.8	-	-	2	4.8	-	-
Finland	777	1	0.1	-	-	-	-	-	-
Germany	46	3	6.5	-	-	-	-	-	-
Ireland	6,955	190	2.7	-	-	20	0.3	49	0.7
Italy	202	7	3.5	-	-	-	-	1	0.5
Norway[6]	7,239	1	<0.1	-	-	0	0	0	0
Slovenia[5]	30	1	3.3	-	-	1	3.3	-	-
Spain	141	3	2.1	-	-	-	-	-	-
At retail									
Austria[7]	1,042	89	8.5	-	-	32	3.1	12	1.2
Belgium[3]	126	17	13.5	-	-	1	0.8	1	0.8
Belgium[8]	335	62	18.5	-	-	12	3.6	10	0
Czech Republic	48	7	14.6	-	-	7	14.6	-	-
Germany	838	108	12.9	-	-	7	0.8	11	1.3
Italy	269	11	4.1	-	-	1	0.4	-	-
Latvia[2]	345	25	7.2	-	-	25	7.2	-	-
Norway[6]	2,243	22	1.0			0	0	2	<0.1
Slovenia	95	7	7.4	-	-	5	5.3	-	-
Spain	495	48	9.7	-	-	16	3.2	-	-
Sweden	197	4	2.0	-	-	-	-	-	-
The Netherlands	1,483	110	7.4	-	-	6	0.4	2	0.1
United Kingdom	1,033	40	3.9	10	1	0	0	4	0.4

1. Data are only presented for sample size >25 with positive findings.
2. In Cyprus, Denmark and Latvia, batch based sampling.
3. In Belgium, cuts.
4. In Belgium, carcasses.
5. In Slovenia, mechanically separated meat.
6. In Norway, imported poultry.
7. Sampled at retail and processing plant.
8. In Belgium, minced meat.

At retail level *Salmonella* was found in 2.0-18.5% of the collected samples. Throughout the production line the lowest levels of *Salmonella* were reported by Sweden. Sweden also tested 1,025 samples at processing without any positive findings. Czech Republic reported no positive finding at slaughter (N=240) nor did Italy (N=43).

In samples of broiler meat products *Salmonella* positive samples ranged from 0.1-6.9%, Table SA5. Italy reported 12.1% positive samples in non-ready to eat products and 10.8% in ready-to-eat products at retail (data not presented in the table). These samples were HACCP samples collected by the industry. HACCP samples are collected specifically at critical control point and may result in a larger number of positive findings than randomly collected samples. Therefore these two types should not be compared directly.

Table SA5. *Salmonella* in broiler meat product samples[1], 2004

				S. Enteritidis		*S.* Typhimurium	
	N	Pos	% Pos	Pos	% Pos	Pos	% Pos
NON-READY-TO-EAT							
At processing plant							
Germany	29	2	6.9	-	-	-	-
Greece	516	4	0.8	-	-	-	-
Hungary	1,558	56	3.6	-	-	-	-
Ireland	2,176	44	2.0	-	-	14	0.6
Spain	75	1	1.3	-	-	-	-
At retail							
Germany	221	11	5.0	2	0.9	-	-
Greece	511	5	1.0	4	0.8	-	-
Italy	153	1	0.7	-	-	1	0.7
Spain	233	7	3.0	3	1.3	-	-
READY-TO-EAT							
At processing plant							
Germany	96	3	3.1	-	-	-	-
Hungary	452	5	1.1	-	-	-	-
Ireland	2,847	13	0.5	1	<0.1	3	0.1
Poland	18,816	17	0.1	-	-	-	-
At retail							
Austria[2]	451	12	2.7	5	1.1	-	-
Belgium[3]	83	5	6.0	-	-	-	-
Germany	436	8	1.8	2	0.5	-	-

1. Data are only presented for sample size >25 with positive findings.
2. Sampled at retail and processing plant.
3. In Belgium, carcasses.

A large number of other broiler meat products tested in Estonia (N=89), Greece (N=325), Ireland (N=1,361) and Sweden (N=89) yielded no positive samples.

Turkey meat and products thereof

A total of 13 MS provided data on *Salmonella* in turkey meat and turkey meat products. In general, sample sizes were small (<25). All MS testing more than 25 samples reported positive findings. These are shown in Table SA6. For those MS with positive findings in fresh turkey meat, the highest levels were found at processing in Germany and the lowest levels at slaughter in Poland. Data were not suitable for trend analysis, but from 2000-2003, 5.7-11.5% of turkey neck-skin and meat samples collected at slaughter and at retail were found positive for *Salmonella*. This is consistent with the levels observed in 2004.

Table SA6. *Salmonella* in turkey meat samples[1], 2004

	N	Pos	%	*S.* Enteritidis		*S.* Typhimurium	
				Pos	% Pos	Pos	% Pos
At slaughter							
Poland	441	3	0.7	-	-	-	-
At processing plant							
Germany	66	8	12.1	-	-	1	1.5
Ireland	478	21	4.4	1	0.2	1	0.2
At retail							
Austria	124	9	7.3	-	-	2	1.6
Germany	707	43	6.1	2	0.3	7	1.0

1. Data are only presented for sample size >25 with positive findings.

In addition to the data shown in Table SA6, Germany reported 6.3% (N=901) and Italy 8,7% (N=160) positive samples in turkey meat samples. However the point of sampling was not provided.

Other poultry meat: Ireland tested 144 samples of fresh duck meat at processing and found 33 (18,6%) positive for salmonella.

Eggs and egg products

Control of *Salmonella* in the table-egg sector is generally done by monitoring and controlling for *Salmonella* in layer flocks. These programmes are described in Appendix Tables SA5 and SA6. *Salmonella* was found in fresh eggs, raw material at processing and at retail level at levels similar to previous years. Proportions of positive samples found in eggs, 2000-2004, are shown in Figure SA5, and results from raw materials and egg products are presented in Table SA7.

For the five MS included in Figure SA5, there was a general increase in the proportion of positive findings from 2000 to 2002. In Italy and Austria, the proportion of positive sample increased from 2003 to 2004. Still, the overall trend from 2002 to 2004 for all five MS has been decreasing.

In raw materials for egg products, Austria, reported less than 3% positive samples for all year except 2004, where 62.1% of samples of raw materials at processing were found positive, most of which were S. Enteritidis. No explanation for this marked increase was given, but the sample size for 2004 was considerable smaller compared to previous years.

In egg products, very few finding have been reported in five out of the six MS included in Table SA7. However, Austria has observed a steady increasing trend, from 0.7-7.1% positive samples from 2000-2004.

Figure SA5. *Salmonella* in table eggs in MS that have reported consistently from 2000-2004

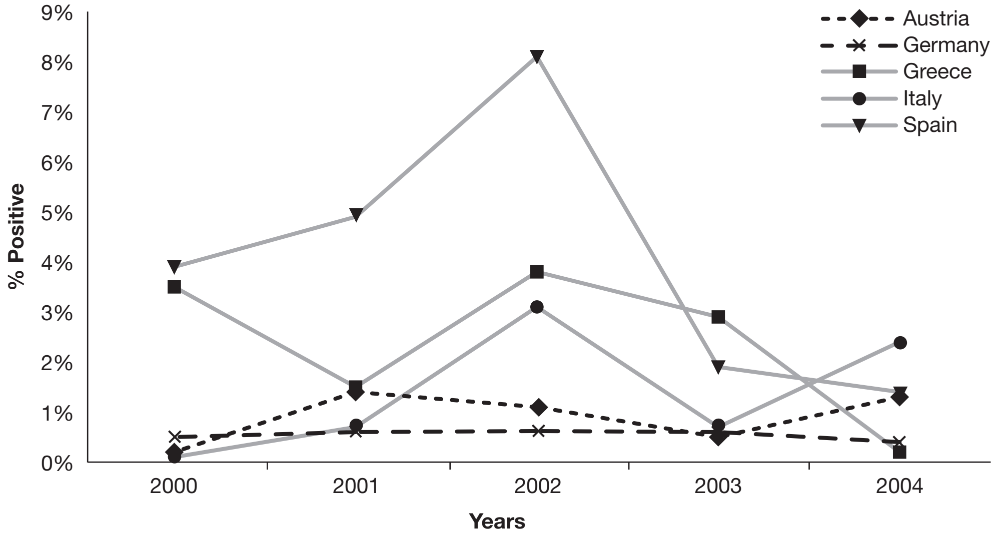


Table SA7. *Salmonella* in eggs and egg products

	2004		2003		2002		2001		2000	
	N	% Pos	N	% Pos	N	% Pos	N	% Pos	N	% Pos
Raw materials (at processing plants)										
Austria	29	62.1	179	2.8	92	0	200	2.5	147	1.4
Germany	-	-	51	0	41	0	53	0	12	0
Ireland	94	0	1,752	0	-	-	4	0	13	7.6
Italy	26	0	29	0	170	0	31	0	204	0
Spain	-	-	165	0.6	84	0	-	-	-	-
Egg products (final products)										
Austria	369	7.1	2,683	5.6	205	1.0	223	2.2	286	0.7
Germany	243	0.8	368	0	228	0	325	0.9	304	1.0
Ireland[1]	911	0.1	392	0	469	0	581	0	479	0
Italy	649	1.4	2,297	<0.1	70	1.4	152	0	3,478	0
The Netherlands	-	-	-	-	-	-	352	7.4	225	0
Spain	476	1.3	616	0.7	312	1.0	-	-	-	-

1. In Ireland, in the data compiled by CVRL, 2 out of 53 samples taken at processing plants were positive.

Findings of *Salmonella* in table egg samples reported in 2004 are presented in Table SA8. In all reporting MS less than 3% of the tested samples were positive.

Table SA8. *Salmonella* in table egg samples[1], 2004

	N	Pos	% Pos	*S.* Enteritidis Pos	*S.* Enteritidis % Pos	*S.* Typhimurium Pos	*S.* Typhimurium % Pos
At packing centre							
Cyprus[2]	604	2	0.3	2	0.3	-	-
Italy	431	11	2.6	9	2.1	-	-
Spain	1,686	24	1.4	13	0.8	-	-
At retail							
Austria	318	4	1.3	3	0.9	1	0.3
Germany	10,179	44	0.4	39	0.4	1	<0.1
Greece	410	1	0.2	1	0.2	-	-
Italy	680	16	2.4	10	1.5	2	0.3
Slovakia	486	6	1.2	6	1.2	-	-

1. Data are only presented for sample size >25 with positive findings.
2. In Cyprus, batch-based sampling.

New MS, Estonia, Latvia and Slovenia reported no findings in samples collected at packaging centres and retail.

Data on the serovar distribution are incomplete, but *S.* Enteritidis was the most common serovar reported in eggs. Please refer to Chapter 3.1.5. on serovar and phagetypes distribution for further information.

Pig meat and products thereof

Monitoring programmes for *Salmonella* in pig meat are in place in several MS, and are described in the Appendix Table SA18. Many of these monitoring programmes are based on sampling at the slaughterhouse and meat cutting plants, and a number of different samples are collected, such as surface swabs, caecal samples and meat samples. In addition to meat samples, some of the new MS also collected environmental samples at all levels of the production as part of their monitoring programmes. In Table SA9, data on the occurrence of *Salmonella* in pig meat have been summarised for those countries that have monitoring programmes.

Table SA9. *Salmonella* in pig meat in countries, which run a monitoring/surveillance programme, 2000-2004

	2004		2003		2002		2001		2000	
	N	% Pos	N	% Pos	N	% Pos	N	% Pos	N	% Pos
Pigs (sample based data) – carcass swabs – at slaughterhouse										
Belgium	374	12.3	287	14.6	298	15.4	293	20.8	436	17.7
Denmark[6]	34,038	0.8	34,460	0.9	36,787	0.8	36,559	1.3	17,954	0.8
Finland	6,576	<0.1	6,186	<0.1	6,260	<0.1	6,254	<0.1	6,387	0
Sweden	5,940	0	6,281	0	6,420	<0.1	6,578	<0.1	6,733	<0.1
Norway	2,456	0	2,353	<0.1	2,371	<0.1	2,417	<0.1	2,542	0
Pig meat at slaughterhouse and cutting plants										
Belgium[1,2]	374	12.3	278	6.1	224	11.2	-	-	-	-
Belgium[3]	-	-	118	1.7	116	7.8	-	-	-	-
Finland[2]	3,092	0	2,826	0.1	1,840	0.1	2,605	0	3,472	0
Sweden[2,3,4]	4,474	0	4,411	0	4,478	0	4,311	0	4,454	<0.1
Pig meat at retail										
Belgium[3]	166	12.7	181	9.4	184	13.0	-	-	-	-
Denmark	-	-	183	0.6	7,003	1.3	715	1.7	1,782	1.1
Finland	-	-	-	-	-	-	-	-	167	0
Germany	1,217	3.9	1,734	3.0	2,193	2.9	1,547	3.8	1,614	3.7
Norway[5]	51	3.9	-	-	221	0	1,039	0.5	4,129	0.3
The Netherlands	333	1.2	227	4.9	105	10.5	-	-		

1. In Belgium, cuts of meat.
2. In Belgium, Finland and Sweden, at cutting plants.
3. In Belgium and Sweden, minced meat.
4. In Sweden, samples from both pig and bovine meat.
5. In Norway, survey regarding imported products.
6. In Denmark, the majority of samples are tested as pools of 5 carcass swabs. At small slaughterhouses: carcass samples are tested individually.

No clear increasing or decreasing trend was observed within these MS and Norway; the proportion of positive findings has remained fairly stable within the countries throughout the period (Table SA9). In The Netherlands, however, the proportion of positive samples at retail has decreased from 10.5% positive samples to 1.2% in 2004. Finland, Sweden and Norway have consistently reported very low levels of *Salmonella* contamination at slaughter and meat cutting plants, ranging from no findings to 0.1% positive samples. Norway reported data from a survey of imported pig meat in 2004, yielding a higher proportion of positive finding than in domestically produced pig meat tested in previous years.

In 2004, 21 MS reported data on *Salmonella* in 85,446 samples of pig meat samples collected at different levels of the production (Table SA10). Denmark, Finland, Germany, Hungary, Latvia, Poland all reported levels of less than 1.5% positive samples at slaughter. The highest proportions of positive samples were reported by Malta, with 32.8% of the samples positive. Italy and Latvia reported higher numbers of positive samples among samples collected by the industry as part of HACCP based programmes than in the official control samples (data not shown in the table). However, it is important to note that samples collected in a HACCP context are usually targeted and not randomly collected.

Positive findings at processing were reported by six MS and in four of these less than 3% of the tested samples were positive. Spain and Belgium reported somewhat higher levels, 4.9% and 10.4%, respectively. At retail, all eight reporting MS found less than 7% of the tested samples positive (Table SA10).

In minced meat, less than 1% of samples in Hungary and Poland were found positive. In Belgium, 7.4% of the samples were positive. Data on the serovar distribution in pig meat are incomplete, but the data that were reported indicates that *S.* Typhimurium is dominating in pig meat.

Table SA10. *Salmonella* in fresh pig meat samples[1], 2004

				S. Enteritidis		*S.* Typhimurium	
	N	Pos	% Pos	Pos	% Pos	Pos	% Pos
At slaughter							
Belgium	374	46	12.3	-	-	15	4.0
Denmark[2]	34,038	274	0.8	1	<0.1	96	0.3
Finland[2]	6,576	2	0	1	0	-	-
Germany	4,744	25	0.5	-	-	13	0.3
Hungary	8,257	111	1.3	5	0.1	29	0.4
Italy	256	11	4.3	-		3	1.2
Italy[2]	1,096	40	3.6	-	-	10	0.9
Latvia	185	2	1.1	-	-	-	-
Malta	400	131	32.8	-	-	-	-
Poland	895	2	0.2	-	-	-	-
Portugal	256	39	15.2	-	-	-	-
Spain	147	15	10.2	15	10.2	-	-
At processing plant							
Belgium	241	25	10.4	-	-	8	3.3
Estonia	225	1	0.4	-	-	-	-
Germany	201	6	3.0	-	-	3	1.5
Ireland	4,485	104	2.3	-	-	52	1.2
Italy	393	8	2.0	1	0.3	3	0.8
Spain	81	4	4.9	-	-	-	-
At retail							
Austria[3]	42	2	4.8	1	2.4	-	-
Germany	1,217	47	3.9	-	-	21	1.7
Ireland	29	2	6.9	-	-	2	6.9
Italy	231	2	0.9	-	-	-	-
Lithuania	46	1	2.2	-	-	1	2.2
Norway	51	2	3.9	0	0	2	3.9
Spain	215	8	3.7	6	2.8	-	-
The Netherlands	333	4	1.2	-	-	2	0.6
Minced meat, at processing plant							
Belgium	271	20	7.4	-	-	8	3.0
Hungary	1,712	16	0.9	1	0.1	4	0.2
Poland	9,172	39	0.4	-	-		-
Minced meat, at retail							
Belgium	166	21	0.1	4	2.4	15	9.0
Italy	241	2	0.8	-	-	-	-
Italy[4]	101	8	0.1	-	-	1	1.0

1. Data are only presented for sample size >25 with positive findings.
2. In Denmark, Finland and Italy, carcasses at slaughter.
3. In Austria, sampled at retail and processing plant.
4. In Italy, official food or feed controls.

In pig meat products *Salmonella* was found in less than 10% of the samples, ranging from 1.0-9.8% in non-ready-to-eat products, with the highest proportions reported by Hungary and Italy (Table SA11). In ready-to-eat products, positive findings were reported by Hungary, Italy and Portugal, in ranges 1.2-3.7%. Belgium, Estonia and Latvia reported no *Salmonella* in pig meat products tested.

Table SA11. *Salmonella* in pig meat products[1], 2004

				S. Enteritidis		*S.* Typhimurium	
	N	**Pos**	**% Pos**	**Pos**	**% Pos**	**Pos**	**% Pos**
NON READY-TO-EAT							
At processing plant							
Hungary	111	9	8.1	0	0	0	0
Ireland	3,427	55	1.6	-	-	22	0.6
Italy	1,200	13	1.1	1	0.1	4	0.3
Luxembourg	98	1	1.0	-	-	-	-
Spain	483	15	3.1	1	0.2	1	0.2
At retail							
Austria[2]	275	3	1.1	-	-	-	-
Ireland	46	2	4.3	-	-	1	2.2
Italy	899	88	9.8	1	0.1	26	2.9
Spain	411	15	3.6	1	0.2	-	-
Official food or feed controls							
Italy	228	9	3.9	-	-	2	0.9
READY-TO-EAT							
At processing plant							
Hungary	17,256	312	1.8	14	0.1	70	0.4
Italy	257	3	1.2	-	-	-	-
At retail							
Italy	330	10	3.0	-	-	4	1.2
Portugal	54	2	3.7	-	-	1	1.9

1. Data are only presented for sample size >25 with positive findings.
2. Sampled at retail and processing plant.

Bovine meat and products thereof

Monitoring programmes similar to the ones in place for pig meat also exist for bovine meat (Appendix Table SA21). Data have been summarised for MS with monitoring and surveillance programmes that have reported data for the past years, Table SA12.

Table SA12. *Salmonella* in bovine meat in countries with a monitoring/surveillance programme, 2000-2004

	2004		2003		2002		2001		2000	
	N	% Pos	N	% Pos	N	% Pos	N	% Pos	N	% Pos
Bovine meat sampled at slaughterhouse (sample based) – carcass swabs										
Belgium	-	-	-	-	191	0	294	2.7	-	-
Denmark[5]	11,540	0.3	12,570	0.2	12,700	0.2	10,890	0.1	2,079	0.5
Finland	3,251	0	3,406	<0.1	3,146	<0.1	3,536	0.3	3,154	0.1
Sweden	3,475	0	3,220	<0.1	3,121	0	3,243	<0.1	3,400	<0.1
Norway	2,136	0	2,353	0.04	2,371	0.04	2,417	0	2,542	0
Bovine meat sampled at slaughterhouse and cutting plants										
Belgium[2,3]	-	-	100	2.0	223	0.9	-	-	-	-
Finland[3]	2,458	<0.1	2,404	0.1	1,948	0.4	2,050	0.2	2,600	0.1
Sweden[3, 4]	4,474	0	4,411	0	4,478	0	4,311	0	-	-
Bovine meat sampled at retail										
Belgium[1]	98	0	207	0.5	2,041	2.9	-	-	-	-
Denmark	-	-	642	2.0	1,400	1.0	642	2.0	1,599	1.2
Germany	363	0.8	494	1.0	590	0.9	438	0.5	-	-
Sweden	1,262	0	1,217	0.4	1,125	1.0	2,490	0.5	-	-
The Netherlands	956	1.1	678	0.6	532	3.0	-	-	-	-
Norway	12,295	0.2	3,550	0.2	2,453	<0.1	14,570	<0.1	1,181	0.3

1. In Belgium, minced meat samples.
2. In Belgium, cuts of meat.
3. In Belgium, Finland and Sweden, at cutting plants.
4. In Sweden, samples collected from both pig and bovine meat. Approximately 40% is estimated to be scrapings collected from beef.
5. In Denmark, the majority of samples are tested as pools of 5 carcass swabs. At small slaughterhouses: carcass samples are tested individually.

Finland, Sweden and Norway reported less than 0.2% positive findings in bovine meat from 2000-2004. For the remaining MS included in Table SA12, proportions of 3% or lower were reported. Data for 2004 are summarised in Table SA13. The proportion of positive samples were low in most reporting MS not exceeding 2% in fresh meat at slaughter and 1% in fresh meat at retail. However at slaughter, higher levels were reported from Estonia (3.9%) and Spain (9.9%). Finland, Luxembourg, Poland and Norway reported no positive samples at slaughter in sample sizes of 156 to 3,251. Similar proportions were also reported at the processing level, except in Spain where 7.1% of the collected samples were positive. However, the number of samples collected was considerably smaller than those collected by the other MS in this foodstuff category.

In minced meat the proportions of positive samples ranged from, 0.6-7.2% at the processing level and 0.1-2.7% at retail. The highest proportions of positive samples were reported by Germany and Spain, at processing level. Of the 339 positive samples from MS providing information on serovar distribution (Table SA13), 43 were *S.* Enteritidis and 53 were *S.* Typhimurium. The proportions of *S.* Enteritidis and *S.* Typhimurium varied between MS.

Table SA13. *Salmonella* in bovine meat samples[1], 2004

				S. Enteritidis		*S.* Typhimurium	
	N	Pos	% Pos	Pos	% Pos	Pos	% Pos
At slaughter							
Austria	3,940	2	0.1	1	0	-	-
Czech Republic	1,328	26	2.0	20	1.5	6	0.5
Denmark	11,579	35	0.3	-	-	4	0
Estonia	310	12	3.9	-	-	-	-
Germany	4,435	33	0.7	-	-	2	0
Hungary	857	8	0.9	0	0	5	0.6
Italy	1,131	5	0.4	4	0.4	-	-
Spain	71	7	9.9	0	0	0	0
At processing and cutting plant							
Finland[2]	2,485	1	0	-	-	1	0
Ireland	13,364	24	0.2	-	-	4	0
Italy	338	1	0.3	1	0.3	-	-
Spain	28	2	7.1	-	-	-	-
At retail							
Germany	363	3	0.8	-	-	-	-
Italy	422	3	0.7	-	-	-	-
Norway[3]	12,295	22	0.2	0	0	0	0
The Netherlands	956	10	1.0	-	-	2	0.2
Italy[4]	701	3	0.4	-	-	1	0.1
Minced meat, at processing plant							
Belgium	230	7	3.0	1	0.4	1	0.4
Germany	83	6	7.2	-	-	4	4.8
Hungary	113	1	0.9	0	0	0	0
Italy	164	1	0.6	-	-	-	-
Spain	1,361	84	6.2	12	0.9	-	-
Minced meat, at retail							
Czech Republic	326	1	0.3	-	-	-	-
Germany	1,763	47	2.7	1	0.1	22	1.2
Italy	409	3	0.7	-	-	1	0.2
Italy[4]	902	1	0.1	-	-	-	-
Italy[5]	585	9	1.5	2	0.3	-	-

1. Data are only presented for sample size >25 with positive findings.
2. In Finland, at cutting plant.
3. In Norway, imported meat.
4. In Italy, fresh meat, official food or feed controls.
5. In Italy, minced meat, official food or feed controls.

Table SA14. ***Salmonella*** **in bovine meat products[1], 2004**

				Salmonella spp.		*S.* Enteritidis		*S.* Typhimurium	
	N	Pos	% Pos	Pos	% Pos	Pos	% Pos	Pos	% Pos
NON-READY-TO-EAT									
At processing plant									
Ireland	4,016	7	0.2	-	-	6	0.2	-	-
Italy	105	1	1.0	-	-	-	-	-	-
Spain	63	1	1.6	-	-	-	-	-	-
Czech Republic[2]	5,818	9	0.2	-	-	-	-	-	-
At retail									
Germany	252	3	1.2	-	-	-	-	-	-
Italy	274	1	0.4	-	-	-	-	1	0.4
READY-TO-EAT									
At processing plant									
Germany	308	7	2.3			5	1.6		
At retail									
Belgium	111	2	1.8	-	-	-	-	-	-
Germany	5,455	90	1.6	2	<0.1	39	0.7	-	-
Italy	51	1	2.0	-	-	-	-	-	-

1. Data are only presented for sample size >25 with positive findings.
2. In Czech Republic, batch samples.

In bovine meat products, few *Salmonella* positive findings were reported, ranging from 0.2-1.6% in non-ready-to-eat products and from 1.6-2.3% in ready to eat products (Table SA14). No positive findings were reported in samples tested in Austria, Luxembourg and Sweden.

Other food

Milk and dairy products

Very few positive finding of *Salmonella* in cow milk were reported in 2004. Data was reported by 11 MS with sample sizes ranging from 25 to 2,067. Only three MS reported positive findings; Austria, Cyprus and Italy (0.8-2.6%). These results are consistent with the levels reported in previous years. Large numbers of dairy products were also investigated in 18 MS, generally yielding no positive findings. *Salmonella* was found by some MS in ice cream, milk powder and other ready-to-eat dairy products ranging from 0.01-1.7%. The majority of these isolates were *S.* Enteritidis. No positive findings were reported from samples of soft and semi soft cheeses. Neither did United Kingdom report any positive findings from a survey comprising 1,842 samples of cheeses made from raw or thermised milk.

Spices and herbs

Six MS reported data on spices. Among these were results from a large survey of imported dried herbs and spices in the United Kingdom, where 1.1% of tested samples were positive. Austria found 7% of the tested samples positive for *Salmonella*, mainly serovars other than *S.* Typhimurium and *S.* Enteritidis. Ireland found *Salmonella* in 0.9% of the tested samples, where all finding were serovars other than *S.* Enteritidis and *S.* Typhimurium.

Fishery products

Findings of *Salmonella* in fishery products were reported by Estonia, Germany, Greece, Hungary, Italy, Spain and Sweden (fish and shellfish), ranging from 0.09% in Germany to 1.4% in Greece. These finding are similar to reports from 2003, where 0.08%-2.0% of the tested samples were found contaminated, with the highest proportions reported by Greece.

Other foodstuffs

Ireland tested 2,462 sheep meat samples for *Salmonella* finding 4 (0.16%) positive. Bakery products and cereals were tested by 6 countries, and Greece and Hungary found positive samples ranging from 0.06-2.1%. Belgium and Greece reported investigations of live bivalve molluscs, and Greece found 1.36% positive. Greece also reported 2 out of 6 examined frog legs *Salmonella* positive.

3.1.3. Salmonella in animals

Laying hen production line

No elite-breeding flocks were found *Salmonella* positive by the 3 Member States who reported information. A total of 9 MS reported on grand-parent-breeding flocks, and Italy found *Salmonella* positive flocks.

In parent-breeding flocks for the laying hen production, the level of *Salmonella* in 2004 varied considerably between the MS with monitoring programmes (Table SA15). No infected flocks were detected in France, Slovenia, Sweden and Norway. In contrast to 2003, infected breeding flocks were found in Denmark, Germany and Italy during 2004.

A total of 6.3% of the flocks were infected during 2004 in the EU-25 MS that conduct *Salmonella* monitoring and control programmes. The new MS had a higher occurrence of *Salmonella* among layer breeders than the old MS (10.7% vs. 4.2%). The highest occurrence was recorded in the Czech Republic where 33.3% of the layer breeding flocks tested positive for *Salmonella*.

Salmonella Enteritidis was the predominating serovar among layer breeding flocks in most of the MS reporting data. During 2004, *S.* Typhimurium was only reported from layer breeders in Finland, Germany and The Netherlands.

Table SA15. *Salmonella* in layer breeders (only parent breeders, all age groups[1], flock based data), 2003-2004 in countries that run monitoring and control programmes in accordance to Council directive 92/117/EEC in 2004

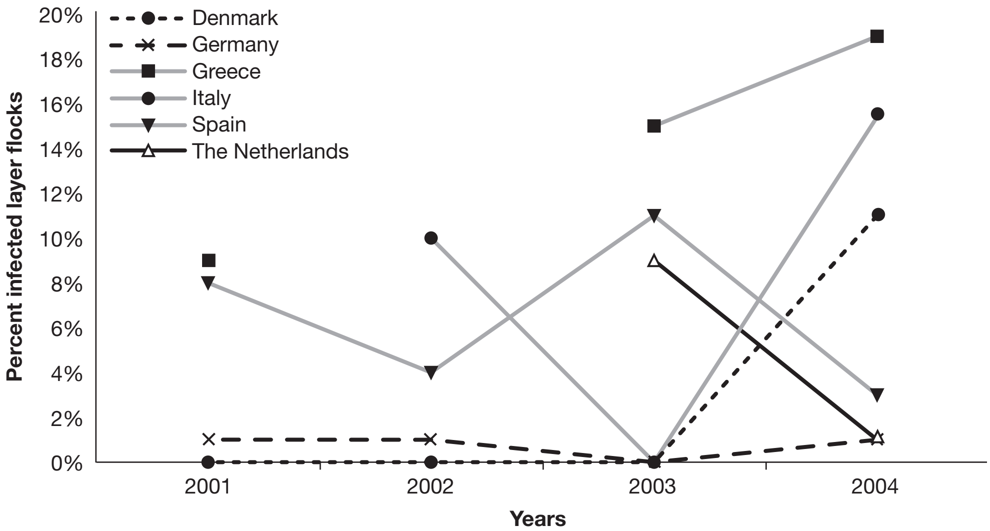
	2004				2003			
	N	% Pos	% *S.* Ent	% *S.* Typ	N	% Pos	% *S.* Ent	% *S.* Typ
Austria	20	5.0	5.0	0	-	-	-	-
Belgium	95	4.2	-	-	-	-	-	-
Czech Republic	42	33.3	33.3	0	-	-	-	-
Denmark	18	11.1	0	0	39	0	-	-
Finland	67	0.5	0	0.5	-	-	-	-
France	140	0	-	-	133	2.2	0.7	1.5
Germany[2]	89	1.1	0	1.1	29	0	-	-
Greece	118	7.6	5.9	0	-	-	-	-
Hungary	199	1.0	1.0	0	-	-	-	-
Ireland	-	-	-	-	51	0	0	0
Italy	144	11.1	-	-	31	0	-	-
Latvia	22	9.1	9.1	0	-	-	-	-
Norway[3]	27	0	0	0	-	-	-	-
Poland	518	14.3	7.5	0	-	-	-	-
Slovenia	52	0	-	-	-	-	-	-
Spain	192	2.6	-	-	143	11	4	0
Sweden[4]	20	0	-	-	30	1	3	0
The Netherlands	282	0.7	0.4	0.4	55	9	7	0
United Kingdom	87	14.9	-	-	-	-	-	-

Note: In Belgium and Hungary, a monitoring programme using a sampling scheme based on the directive has been implemented.

1. Combined data (day-old chicks, rearing and production) have been used to estimate the percentage of positive flocks. This percentage represents flocks found positive at any point of the lifespan of a flock).
2. In Germany, production period only.
3. In Norway, rearing and production period only, data relates to farms not flocks.
4. In Sweden, rearing and production period only.

As the reporting has been inconsistent for many MS, a community trend for *Salmonella* in layer-breeding flocks could not be estimated. However, among the MS that operated control programmes for breeding flocks according to the Zoonoses Directive, and reported consistently during the period 2001 to 2004, the occurrence of *Salmonella* varied considerably. In Italy and Spain between 0% and 15% of the tested flocks were positive in 2001 to 2004. In Greece the proportion of infected flocks increased rapidly from 2002 to 2004. Also Denmark reported an increase in 2004 following three years with no positive findings. In contrast, data from The Netherlands indicated a decrease from 2003 to 2004. The level of positive flocks remained low during the four-year period in Germany, Ireland, Norway and Sweden (Figure SA6).

Figure SA6. Proportion of *Salmonella* positive layer breeding flocks (only parent flocks[1], all age groups) in MS running a monitoring and control programme during the period 2001-2004



Note: In Sweden infected breeding flocks were only detected in 2003 (1%), In Ireland, no infected flocks were detected in 2001 to 2003 (no data from 2004) and in Norway no infected flocks were detected 2001-2004. No data from Greece 2002, Ireland 2004, Italy 2001 and The Netherlands 2001 and 2002.

1. Combined data (day-old chicks, rearing and production) have been used to estimate the percentage of positive flocks. This percentage represents flocks found positive at any point in the lifespan of a flock.

In laying hens, no *Salmonella* infected flocks were detected in Finland and Luxembourg. Several MS reported a low occurrence, whereas Belgium, Greece and Spain reported a high proportion of positive layer flocks (ranging from 27 – 32%) (Table SA16). Among the MS reporting data from both breeding and production flocks, most MS that reported few infected breeder flocks (Austria, Denmark, Finland, France, Germany, Ireland, Sweden and The Netherlands) also reported relatively low *Salmonella* occurrence (less than 4%) in rearing and production flocks.

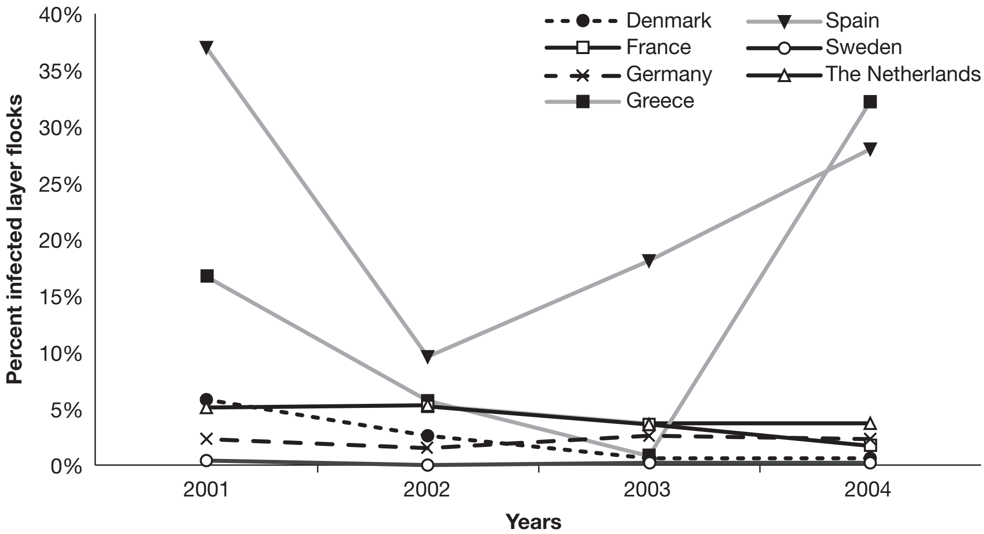
Table SA16. ***Salmonella*** **in laying hen flocks (all age groups[1], flock based data), 2003-2004**

Country	2004				2003			
	N	% Pos	% *S.* Ent	% *S.* Typ	N	% Pos	% *S.* Ent	% *S.* Typ
Austria	2,649	1.5	0.8	0	-	-	-	-
Belgium	265	27.2	-	-	-	-	-	-
Cyprus	75	12	4.0	0	-	-	-	-
Czech Republic	270	6.7	6.7	0	-	-	-	-
Denmark	1,009	0.6	0.3	0.1	2,934	0.6	0.5	0
Finland	2,111	<0.1	-	<0.1	2,347	0	0	0
France	5,935	2.0	1.6	0.4	5,421	2.3	1.9	0.4
Germany	4,916	2.3	1.1	0.4	3,623	2.6	0.9	1.0
Greece	90	32.2	14.4	2.2	258	0.8	0.4	0
Ireland	355	0.8	0.8	0	-	-	-	-
Lithuania	1,392	0.4	0.2	-	-	-	-	-
Luxembourg	44	0	-	-	-	-	-	-
Norway	1,090	0	-	-	844	0	-	-
Spain	50	28.0	20.0	0	991	18.1	9.5	1.7
Sweden	909	0.2	-	-	1,178	0.2	0.1	0
The Netherlands[2]	3,148	3.7	-	-	2,328	3.7	3.5	0.4

1. Combined data (day-old chicks, rearing and production) have been used to estimate the percentage of positive flocks. This percentage represents flocks found positive at any point of the lifespan of a flock.
2. In The Netherlands, prevalence data is based on serology.

Among the MS that had a monitoring and control programme, and reported consistently from 2001 to 2004 (Figure SA7), the proportion of *Salmonella* positive layer flocks decreased in Denmark (from 5.8% to 0.6%), France (from 5.2% to 1.7%) and the Netherlands (5.1% to 3.7%), and remained at a low level in Germany (2.3%) during this period. The highest levels were reported from Spain and Greece. In Spain, a substantial increase in the proportion of *Salmonella* positive laying hen flocks has occurred since 2002 (9.6% to 28%). In Greece the decrease observed from 2001 to 2003 (16.7% to 0.8%), was followed by a significant increase in 2004 (32.3%), which may be explained by the increase seen in layer breeders.

Figure SA7. Proportion of *Salmonella* positive layer flocks (all age groups[1]) in MS conducting a monitoring and control programme, 2001-2004



Note: No data from France 2001.
1. Combined data (day-old chicks, rearing and production) have been used to estimate the percentage of positive flocks. This percentage represents flocks found positive at any point in the lifespan of a flock.

As in 2002 and 2003 no *Salmonella* positive breeding, rearing or production flocks of laying hens were detected in Norway during 2004. An overview of the reported data is presented in Level 3, Table SA10-11.

Meat production line (Broilers)

No elite breeding flocks were found *Salmonella* positive. Hungary reported 1 positive grandparent flock.

In parent breeding flocks, no infected flocks were detected in Latvia, Lithuania, Norway, Sweden and The Netherlands (Table SA17). Overall 3.3% of flocks were infected in 2004 in the EU-25 MS that conduct monitoring and control programmes. In the new MS with *Salmonella* programmes, the estimated overall occurrence of *Salmonella* among broiler breeding flocks were lower than in the old MS (0.2% vs. 4.2%). A large number of *Salmonella* isolates other than *S.* Enteritidis or *S.* Typhimurium, (mainly *S.* Senftenberg and *S.* Livingstone) were reported from the UK from monitoring of environmental samples taken in the hatcheries. The salmonella isolates may indicate persistent infection in the hatchery environment or a few infected supply flocks.

Salmonella Enteritidis was the most common serovar isolated from broiler breeding flocks in most of the MS reporting data. In contrast to the layer breeders, *S.* Typhimurium was also detected in broiler breeders in several MS (Table SA17).

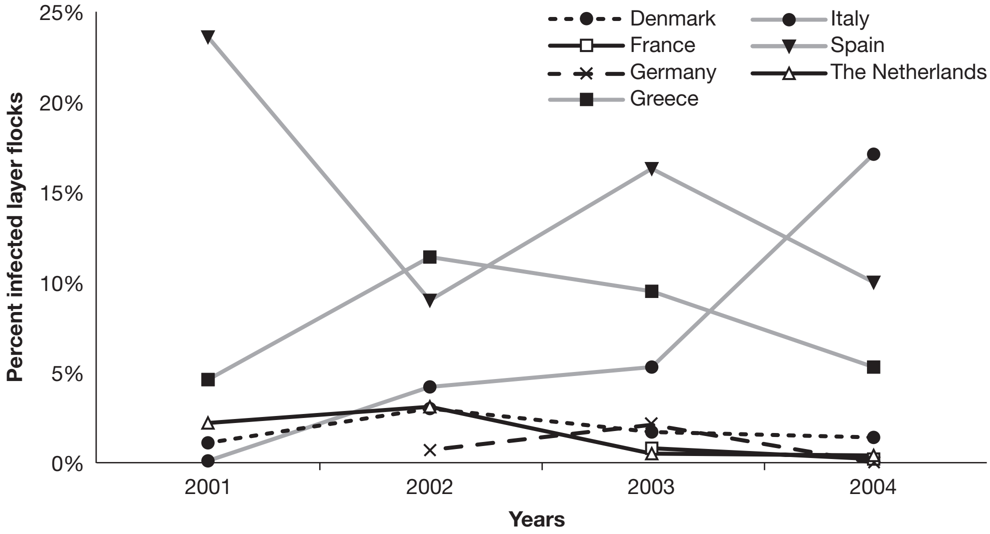
Table SA17. ***Salmonella*** **in broiler breeders (only parent breeders, all age groups[1], flock based data), 2003-2004. Including countries that run a programme in accordance to Council Directive 92/117/EEC in 2004**

	2004				2003			
	N	% Pos	% *S.* Ent	% *S.* Typ	N	% Pos	% *S.* Ent	% *S.* Typ
Austria	57	3.5	-	-	-	-	-	-
Belgium	1,010	3.5	0.1	0.4	-	-	-	-
Czech Republic	325	2.5	2.5	0	-	-	-	-
Denmark	438	1.4	-	-	408	1.7	0.2	1.5
Finland	255	0.4	-	-	-	-	-	-
France	2,186	0.2	0.1	<0.1	2,250	0.7	0.5	0.2
Germany[2]	2,271	0.4	-	-	207	0.5	0	0
Greece	660	5.3	1.8	0.9	148	9.5	6.1	0.7
Hungary	1,834	4.8	1.8	0.8	-	-	-	-
Ireland	548	7.3	-	-	-	-	-	-
Italy	352	13.6	0.4	0.6	266	5.3	0.4	0
Latvia	28	0	-	-	-	-	-	-
Lithuania	172	0	-	-	-	-	-	-
Norway[3]	182	0	-	-	78	0	-	-
Poland	2,297	5.1	3.3	0.1	-	-	-	-
Slovenia	35	5.7	5.7	0	-	-	-	-
Spain	1,000	10.4	2.4	0	-	-	-	-
Sweden	288	0	-	-	258	0	-	-
The Netherlands	2,589	0	0	0	389	0	0	0
United Kingdom[4]	533	37.1	0	0	-	-	-	-

Note: In Belgium and Hungary, a monitoring programme using a sampling scheme based on the directive has been implemented.
1. Combined data (day-old chicks, rearing and production) have been used to estimate the percentage of positive flocks. This percentage represents flocks found positive at any point of the lifespan of a flock.
2. In Germany, production and rearing phase only.
3. In Norway, rearing and production period only, include grandparent flocks. Data from 2003 relates to holdings not flocks.
4. In the UK, 198 positive findings, mainly from environmental sampling at hatchery and not possible to relate to a specific number of flocks.

A community trend for *Salmonella* in broiler breeding flocks could not be estimated on the basis of available data. However, among the MS that operated control programmes for breeding flocks according to the Zoonoses Directive, and reported consistently during the period 2001 to 2004, the occurrence of *Salmonella* in Denmark, Germany, France and The Netherlands remained at a low level during the four-year period, the proportion of infected flocks decreased in Spain and Greece (from 2002) but increased in Italy (Figure SA8).

Figure SA8. Proportion of *Salmonella* positive broiler breeding flocks (only parent breeding flocks, all age groups[1]) in MS conducting a surveillance programme, 2001-2004



Note: In Sweden and Norway infected breeding flocks were not detected from 2001 to 2004.
1. Combined data (day-old chicks, rearing and production) have been used to estimate the percentage of positive flocks. This percentage represents flocks found positive at any point in the lifespan of a flock.

In the broiler production, *Salmonella* infected flocks were detected during 2004 in all the reporting MS, and the proportion of positive broiler flocks ranged from less than 1% in Finland and Sweden to 23.4% in Cyprus (Table SA18). Among the MS reporting data from both breeding and production flocks, most of the MS reporting low *Salmonella* occurrence in the broiler breeder flocks also reported relatively few (less than 4%) infected rearing and production flocks (Austria, Denmark, Finland, Slovenia and Sweden). In Spain, the high level of infection among the breeding flocks (10.4%) was also reflected in a high proportion of infected broiler flocks (15.2%).

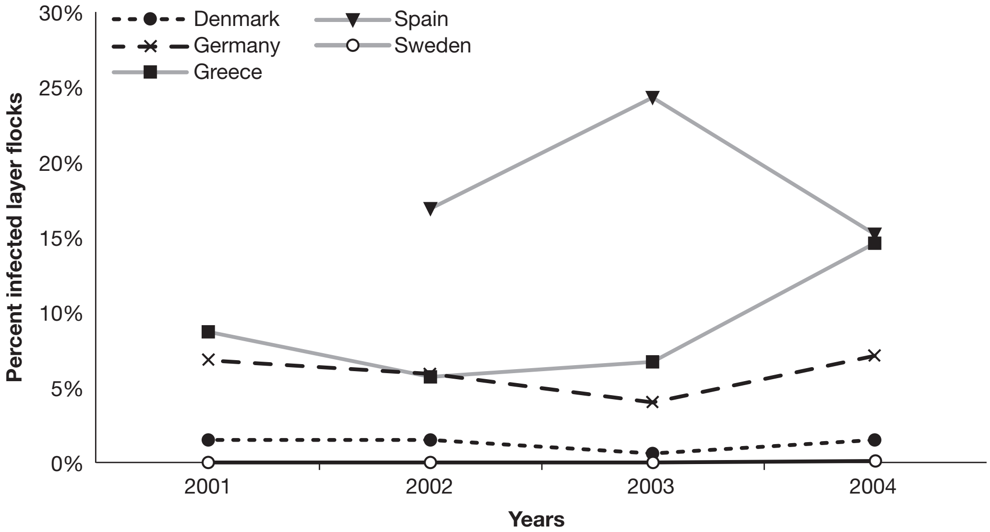
Table SA18. *Salmonella* in broiler flocks (all age groups[1], flock based data), 2004 and 2003

	2004				2003			
	N	% Pos	% *S.* Ent	% *S.* Typ	N	% Pos	% *S.* Ent	% *S.* Typ
Austria	3,619	3.3	2	0.1	-	-	-	-
Belgium	5,381	7.2	-	-	-	-	-	-
Cyprus	218	23.4	0.1	0	-	-	-	-
Denmark	4,313	1.5	0.1	0.3	13,155	0.6	0	0.2
Finland	3,132	0.2	-	-	3,447	0.1	0	0
France	-	-	-	-	-	-	-	-
Germany	1,546	7.1	0.2	0.6	227	4	2.6	0
Greece	582	14.6	0.5	0.9	2,016	6.7	4.6	0
Ireland	-	-	-	-	-	-	-	-
Italy	-	-	-	-	-	-	-	-
Lithuania	1,737	1	0.8	-	-	-	-	-
Norway	3,772	0	-	-	-	-	-	-
Poland	22,552	7.8	3.4	0.3	-	-	-	-
Portugal	32	6.3	6.3	-	-	-	-	-
Slovakia	1,944	3.2	2.7	0.1	-	-	-	-
Slovenia	1,146	1	0.3	-	-	-	-	-
Spain	415	15.2	9.9	0.7	2,020	24.3	17.7	0.2
Sweden	3,000	0.1	-	-	2,815	0	0	0
The Netherlands	28,279	3.9	-	-	-	-	-	-

1. Combined data (day-old chicks, rearing and production) have been used to estimate the percentage of positive flocks. This percentage represents flocks found positive at any point in the lifespan of a flock.

Among the MS that operated monitoring programmes for broiler flocks and reported consistently during the period 2001 to 2004 (Figure SA9), the proportion of *Salmonella* positive broiler flocks remained at the same level in Denmark (2%), Germany (7%) and Sweden (<0.1%), but increased in Greece from 2003 to 2004 (6.7% to 14.6%). The highest levels were reported from Spain, where the proportion of *Salmonella* positive broiler flocks in 2003 (24%) exceeded the levels in 2002 (17%) and 2004 (15%).

Figure SA9. Proportion of *Salmonella* positive broiler flocks (all age groups[1]) in MS running a monitoring and control programme, 2001-2004



Note: No data from Sweden 2002, Spain 2001.

1. Combined data (day-old chicks, rearing and production) have been used to estimate the percentage of positive flocks. This percentage represents flocks found positive at any point in the lifespan of a flock.

As in 2002 and 2003 no *Salmonella* positive broiler breeding or production flocks were detected in Norway. An overview of the reported data is presented in Level 3, Table SA10-11.

Ducks and geese

Only Poland tested a substantial number of duck-breeding flocks in 2004 and found that 7.9% were infected. Within the MS reporting data from at least 25 production flocks, the proportion of infected flocks ranged from 4.8 to 57.2% (Table SA19). As in 2003, very high levels were found in Danish duck flocks (57.2%), and medium levels in Germany (10.7%). *Salmonella* was not detected at the tested farms in Norway during 2003 and 2004. An overview of the reported data is presented in Level 3, Table SA11.

Table SA19. Salmonella in production flocks[1] of ducks (all age groups[2], flock based data), 2004

	Production flocks			
	N	% Pos	% *S.* Ent	% *S.* Typ
Austria	38	5.3	5.3	0
Denmark	201	57.2	-	-
Germany	122	10.7	0	0.8
Italy	21	4.8	-	-
Norway[3]	48	0	-	-
Poland	442	15.6	2.5	1.8

1. Include MS reporting data from at least 25 flocks.
2. Combined data (day-old chicks, rearing and production) have been used to estimate the percentage of positive flocks. This percentage represents flocks found positive at any point of the lifespan of a flock.
3. In Norway, data are related to farms, not flocks.

Similarly, only Poland tested a substantial number of geese breeding flocks, and found that 1.4% was infected. Within the three MS reporting data from at least 25 production flocks, the proportion of infected flocks ranged from 6.8 to 14.6% (Table SA20).

Salmonella in ducks was also reported by Belgium, Ireland, Portugal and Sweden and in geese by Greece, Italy, Slovakia, Sweden and United Kingdom. An overview of the reported data is presented in Level 3, Table SA11.

Table SA20. *Salmonella* in production flocks[1] of geese (all age groups[2], flock based data), 2004

	Production flocks			
	N	% Pos	% *S.* Ent	% *S.* Typ
Austria	48	14.6	0	0
Germany	88	6.8	0	2.3
Poland	2,708	7.4	1.8	1.7

1. Include MS reporting data from at least 25 flocks.
2. Combined data (day-old chicks, rearing and production) have been used to estimate the percentage of positive flocks. This percentage represents flocks found positive at any point of the lifespan of a flock.

Turkeys

Poland and Finland were the only MS that tested a substantial number of turkey breeding flocks in 2004, and found that 3.3% and 0% infected, respectively. Within the MS reporting data from at least 25 production flocks, the proportion of infected flocks ranged from 0 to 35.8% (Table SA21). As in previous years, the proportion of infected flocks was low in Finland, Norway and Sweden. In Austria and Germany the proportion of positive flocks were lower than in 2003.

Table SA21. ***Salmonella*** **in production flocks[1] of turkeys (all age groups[2], flock based data), 2004**

	Production flocks			
	N	% Pos	% *S.* Ent	% *S.* Typ
Austria	185	7	0	1.1
Finland	989	0.1	0	0.1
Germany	1,627	4.5	0.3	0.7
Italy	57	14	-	-
Norway	347	0	-	-
Poland	4,424	8.6	0.5	0.9
Slovakia	53	35.8	0	1.9
Sweden	131	0	-	-

1. Include MS reporting data from at least 25 flocks.
2. Combined data (day-old chicks, rearing and production) have been used to estimate the percentage of positive flocks. This percentage represents flocks found positive at any point of the lifespan of a flock.

Salmonella in turkeys were also reported by Greece, Ireland, Slovakia and Spain. An overview of the reported data is presented in Level 3, Table SA11.

Pigs

Five MS (Estonia Finland, Italy, Sweden and The Netherlands), and Norway reported data from active monitoring of pigs in breeding and fattening herds (Table SA22). In Finland, Norway and Sweden, the situation was comparable to previous years as no or very few *Salmonella* infected herds/animals were detected in 2004.

Only The Netherlands reported data from fattening pigs. A total of 29.4% of the fattening herds tested in The Netherlands, and 25.4% of the batches of fattening pigs tested prior to slaughter in Italy, were *Salmonella* positive. A similar high proportion of positive herds (29%) were also reported by The Netherlands in 2001 and 2002 (no data from 2003).

Most of the other reported pig data were from diagnostic samples and *S.* Typhimurium was the dominant serovar. An overview of the reported data is presented in Level 3, Table SA13.

Table SA22. ***Salmonella*** **in pigs from MS that run a monitoring programme, 2004**

	Unit	N	% Pos	% *S.* Ent	% *S.* Typ
Faecal samples, collected at farm					
Estonia	Animal (unspecified)	532	0.4	-	-
Finland	Animal (boars, AI station)	216	0	-	-
Finland	Herd (breeding)	144	0	-	-
The Netherlands	Herd (fattening)	221	29.4	-	-
Norway	Herd (breeding)	164	0	-	-
Faecal samples, collected prior to slaughter					
Italy[1]	Slaughter batches (fattening)	173	25.4	0.6	5.8
Italy[1]	Slaughter batches (unspecified)	18	5.6	-	-
Lymph nodes, collected at slaughter					
Finland	Animal (breeding)	3,304	0.2	-	0.1
Finland	Animal (fattening)	3,336	0	-	-
Norway	Animal (breeding)	893	0.1	-	-
Norway	Animal (fattening)	1,769	0		
Sweden	Animal (fattening)	3,191	0	-	-
Sweden	Animal (breeding)	2,782	0	-	-
Carcass swabs, collected at slaughter					
Sweden	Animal (fattening)	3,190	0	-	-
Sweden	Animal (breeding)	2,750	0	-	-

1. In Italy, only the Veneto Region has a monitoring programme.

Cattle

Data from active monitoring of cattle herds was reported in four MS (Estonia Finland, Italy and Sweden), and Norway (Table SA23). In Finland, Norway and Sweden, the situation was comparable to previous years, as no or very few *Salmonella* infected herds/animals were identified in 2004. In Italy the proportion of infected herds was slightly higher (1.5%).

Most of reported cattle data were from diagnostic samples, where *S.* Dublin, *S.* Enteritidis and *S.* Typhimurium were the dominant serovars. An overview of the reported data is presented in Level 3, Table SA13.

Table SA23. ***Salmonella*** **in cattle from MS that run a monitoring programme, 2004**

	Unit	N	% Pos	% *S.* Ent	% *S.* Typ
Faecal samples, collected at farm					
Estonia	Animal	983	0.1	-	-
Finland	Herd (bulls at AI station)	214	0	-	-
Faecal samples, collected prior to slaughter					
Italy	Herd	524	1.5	0	1.0
Lymph nodes, collected at slaughter					
Finland	Animal	3,058	0.2	0	0.2
Norway	Animal	2,302	0.1	0	0.1
Sweden	Animal	3,470	0	-	-
Carcass swabs, collected at slaughter					
Sweden	Animal	3,475	0	-	-

Other animals

Other poultry species, such as guinea fowl, ostriches, partridges, quails, and pheasants, as well as wild birds, were tested for *Salmonella* in some MS. Results show that all types of poultry can be infected with *Salmonella* and both *S.* Enteritidis and *S.* Typhimurium are present. An overview of the reported data is presented in Level 3, Table SA12.

The reported data on *Salmonella* in sheep, goats and solipeds were primarily results from diagnostic submissions. In several countries, *Salmonella* was detected in sheep (Germany, Ireland, Norway, Portugal and Spain), goats (Greece and Norway) and solipeds (Austria, Germany, Ireland, Poland, Spain and The Netherlands). In Norway, only the specific serotype *S. enterica* subsp. *diarizonae* 61:(k):1,5,(7) was isolated from sheep and goats. In Italy, control programmes and surveys found no infected sheep, goats or solipeds during 2004, whereas several water buffaloes tested positive. In pets, *Salmonella* was detected in cats and dogs, and at a relatively high rate in reptiles. An overview of the reported data is presented in Level 3, Table SA13.

3.1.4. Salmonella in feedingstuffs

Information regarding *Salmonella* in feedingstuff was reported by most MS (no data from Malta). Data could not be separated into MS with comparable surveillance programmes and those reporting random sampling of domestic and imported feedingstuffs (Appendix, Table SA1). Presentation of sample and batch based data from the different monitoring systems were therefore summarised, and may include both domestic and imported feedstuffs. Data were excluded when either the number of tested units or number of positive units were not reported. Due to significant differences in monitoring and reporting strategy data are not comparable between MS, and cannot be considered as national prevalences. All reported data are presented in Level 3, Table SA14-SA16.

Compared to previous years, the occurrence of *Salmonella* in fishmeal in 2004 decreased in most MS reporting data for 25 samples or more (Table SA24). In these MS, 0-7.5% of the tested units were positive, the highest reported by Latvia. In Greece, Spain and Sweden, the occurrence of *Salmonella* in fishmeal increased in 2004, where 3.4-5.6% of the tested units were contaminated (Table SA24). Overall, *Salmonella* contamination of meat and bone meal was comparable to previous years, with a contamination rate between 0-3.1% for MS reporting data for 25 samples or more.

Table SA24. *Salmonella* in animal derived feed material, 2000-2004

	2004		2003		2002		2001		2000	
	N	% Pos	N	% Pos	N	% Pos	N	% Pos	N	% Pos
Fishmeal										
Austria[1]	44	0	59	6.8	63	9.5	14	21.4	39	7.7
Belgium	29	3.4	8	12.5	-	-	-	-	-	-
Cyprus	42	0	128	0.8	-	-	-	-	-	-
Denmark	-	-	339	0	406	0.2	403	1.7	234	0.9
France[1]	41	0	57	1.8	12	0	-	-	-	-
Germany[2]	1,628	1.3	97	7.2	14	0	40	2.5	18	22.2
Greece[1]	43	4.7	13	0	57	0	132	1.5	70	0
Italy	110	0	183	1.1	371	1.1	203	3.9	209	2.9
Latvia	576	7.5	247	9.7	-	-	-	-	-	-
Lithuania	130	0.8	108	1.9	-	-	-	-	-	-
Norway[2]	49	0	5,187	0.1	8,989	0.1	6,466	0.1	6,784	0.6
Poland	1,720	0	-	-	-	-	-	-	-	-
Slovenia	77	0	-	-	-	-	-	-	-	-
Spain[1,2]	89	5.6	83	2.4	265	0.8	51	0	37	2.7
Sweden	669	3.4	228	0	332	0.3	321	0	260	0
The Netherlands	821	0.9	493	1.2	799	3.8	109	6.4	883	4.9
United Kingdom[2]	-	-	27	7.4	-	-	-	-	126	21.4
Meat and bone meal										
Czech Republic	60	0	-	-	-	-	-	-	-	-
Denmark	7,979	2.1	5,365	0.3	269	2.2	269	0	73	1.4
Finland[2]	117	0	97	0	98	0	203	0	418	0
Germany	974	1.7	1,360	1.5	827	4.4	252	3.2	1,213	0.6
Italy	1,983	0.1	197	2.0	247	2.8	467	0.9	1,333	1.5
Lithuania	-	-	9	0	-	-	-	-	-	-
Norway	611	0.2	584	0.9	684	0.1	820	0.0	1,867	0
Poland	1,239	1.3	0	-	-	-	-	-	-	-
Spain[2]	41	2.4	88	0	366	1.9	382	2.6	8,693	0
Sweden[2]	716	1.8	932	0.3	155	1.3	1,364	0.1	3,529	0.1
The Netherlands	64	3.1	25	4.0	71	0	143	3.5	962	3.3
United Kingdom[2]	-	-	30	20.0	21	0	14	14.3	32	6.3

1. Data include other fish products in the fishmeal category from Austria (2001, 2002), France (2001), Greece (2000, 2001, 2002) and Spain (1999, 2002).
2. Import data excluded from Finland (1999, 2000, 2003), Germany (2004), Norway (2000, 2001, 2002), Spain (1999, 2000, 2001, 2002), Sweden (2002) and United Kingdom: 2000, 2001, 2002.

The level of *Salmonella* contamination in feed material of vegetable origin varied considerable between countries in 2004, especially for oil seeds and products thereof. No general trend was apparent (Table SA25). Overall, *Salmonella* contamination of cereals ranged between 0-3.2%, and 0-7.6% for oil seeds and products, respectively, for MS reporting data for 25 samples or more in at least one reporting year.

Table SA25. *Salmonella* in vegetable derived feed material, 2000-2004

	2004		2003		2002		2001		2000	
	N	% Pos	N	% Pos	N	% Pos	N	% Pos	N	% Pos
Cereals										
Austria	410	3.2	444	1.4	70	2.9	17	0	649	0.9
Belgium	81	0	38	0	-	-	7	0	19	0
Finland[1]	44	0	61	1.6	79	1.3	98	1.0	-	-
France	76	2.6	70	5.7	16	0	29	0	267	0
Germany	892	0.6	871	0.9	829	1.0	394	1.3	304	1.3
Greece	25	0	5	0	35	0	37	0	5	0
Ireland	44	0	37	0	33	0	18	0	12	0
Italy	116	1.7	57	0	762	2.5	129	2.3	216	0.5
Latvia	38	0	51	5.9	-	-	-	-	-	-
Lithuania	58	0	-	-	-	-	-	-		
Norway[1]	1,083	0.0	-	-	-	-	-	-	1	0
Poland	466	0.6	-	-	-	-	-	-	-	-
Spain[1]	77	0	105	2.9	148	3.4	15	6.7	29	0
Sweden[1]	225	2.7	-	-	192	0	158	0	132	0
The Netherlands	2,994	0.3	2,232	0.6	2,425	0.8	207	0	805	0.4
Oil seeds and products										
Austria	21	0	469	3.0	273	6.2	258	5.0	234	24.4
Belgium	156	0.6	29	0	-	-	5	0	39	5.1
Cyprus	46	0	154	1.9	-	-	-	-	-	-
Czech Republic	42	0	-		-	-	-	-	-	-
Denmark	1,101	4.5	104	1.9	-	-	-	-	-	-
Finland[1]	444	4.7	264	1.5	322	6.8	275	0.7	-	-
France	312	4.8	338	4.4	526	3.4	875	4.1	1,248	6.6
Germany	1,544	7.6	1,345	7.5	1,201	8.1	693	1.9	773	3.4
Greece	56	1.8	2	50.0	49	4.1	12	0	9	22.2
Ireland	62	6.5	36	0	39	7.7	13	7.7	27	0
Italy	119	2.5	28	7.1	44	0.0	9	22.2	17	5.9
Latvia[1]	36	2.8	-	-	-	-	-	-	-	-
Lithuania	173	2.9	-	-	-	-	-	-	-	-
Norway	3,927	0.4	25	4.0	6	0	1	0	16	0
Poland[1]	1,261	2.6	-	-	-	-	-	-	-	-
Portugal[1]	1	0.0	44	11.4	20	25.0	2	100	2	100
Spain	48	0.0	95	15.8	61	3.3	-	-	33	9.1
Sweden	2,431	2.2	1,252	0.5	1,993	0.3	1,692	0	1,711	0.2
The Netherlands	12,675	6.8	10,421	5.1	9,305	6.0	525	6.3	2,835	4.3
United Kingdom	-	-	12,475	3.0	6,035	4.3	14,842	2.2	19,638	1.9

1. Import data excluded from Finland (1999, 2000, 2001, 2002, 2003), Norway (2000, 2001, 2002, 2003), Spain (1999, 2000, 2001, 2002) and Sweden (2000, 2001, 2002).

In compound feedingstuffs, the *Salmonella* contamination rates were comparable to previous years, and ranged from 0-1.1% in cattle feed, 0–1.9% in pig feed and 0–6.3% in poultry feed (Table SA26). In poultry feed, a relatively high *Salmonella* occurrence was found in Greece (6.3%), Ireland (5.1%), Italy (3.9%) and Latvia (2.7%) in 2004. As for all feedingstuff results, the relevance of these high contamination rates depend on whether the data are representative of the feedingstuff available in the country, or it reflects intensive sampling of high risk products. The national reports from 2004 do not include this information.

Table SA26. *Salmonella* in compound feedingstuffs (final products), 2000-2004

	2004		2003		2002		2001		2000	
	N	% Pos	N	% Pos	N	% Pos	N	% Pos	N	% Pos
Cattle feed										
Belgium	-	-	112	0.9	42	0	29	0	4	0
Denmark	-	-	378	0.3	754	0.3	741	0.4	721	0.6
Finland[1]	453	0	513	0	439	0	370	0	360	0
Germany	261	0	-	-	-	-	-	-	-	-
Greece	-	-	60	0	17	0	20	0	3	0
Ireland	56	0	44	0			39	5.1	3	0
Italy	206	1.0	168	0	44	2.3	76	0.0	243	1.2
Latvia	6	0	117	1.7	-	-	-	-	-	-
Poland	477	0.4	-	-	-	-	-	-	-	-
Slovenia	-	-	26	7.7	-	-	-	-	-	-
Spain	177	1.1	384	2.3	470	4.5	336	1.2	18	0
The Netherlands	-	-	1,409	0.9	1,671	0.8	3,394	0	2,739	1.1
Pig feed										
Austria	15	0	72	0	77	2.6	5	0	7	28.6
Belgium	-	-	180	1.1	7	0	21	4.8	22	4.5
Czech Republic	5	0	-	-	-	-	-	-	-	-
Denmark	-	-	796	0.1	1,498	0	1,552	0.1	1,436	0.3
Finland[1]	299	0	241	0	235	0	157	0	201	0
Germany	569	0.2	-	-	-	-	-	-	-	-
Italy	116	0.9	-	-	-	-	-	-	-	-
Latvia	67	0	152	2.6	-	-	-	-	-	-
Norway	44	0	69	0	104	0	67	0	61	0
Poland	1,827	1.2	-	-	-	-	-	-	-	-
Slovenia	53	1.9	43	4.7	-	-	-	-	-	-
Spain	97	1.0	89	0	120	8.3	64	1.6	10	0
The Netherlands	3,048	0.6	2,904	0.6	3,146	0.6	3,213	0.3	2,459	0.4
Poultry feed										
Austria	321	0.6	683	0.9	377	1.6	656	5.2	160	14.4
Belgium	-	-	106	1.9	33	0	43	0	12	8.3
Denmark	-	-	164	0	350	0	262	0	249	0
Finland[1]	175	0	243	0	180	0	146	0	196	0
France	-	-	50	4.0	24	0	-	-	102	2.0
Germany	408	0.5	-	-	-	-	-	-	-	-
Greece	176	6.3	344	3.2	68	0	36	0	35	0
Ireland	570	5.1	14	0	325	0	3,392	4.0	59	0
Italy	356	3.9	-	-	-	-	-	-	-	-
Latvia	150	2.7	120	2.5	-	-	-	-	-	-
Norway	28	0	61	0	78	0	78	0	71	0
Poland	2,682	0.9	-	-	-	-	-	-	-	-

1. Import data excluded from Finland (1999, 2000, 2001, 2003).

The reported occurrences of *S.* Enteritidis and *S.* Typhimurium in feedingstuffs were low. *S.* Enteritidis was detected in final products of compound feedingstuff for farm animals in Italy, Poland, Slovenia, Spain and The Netherlands. *S.* Typhimurium was detected in Belgium, Germany, Ireland, Italy, Poland and The Netherlands. In feed of vegetable origin, Austria, France, Germany, Italy, Poland, Sweden and United Kingdom reported findings of *S.* Enteritidis or *S.* Typhimurium. Denmark, Germany, Hungary, Italy, Poland, Slovakia, Spa in and United Kingdom detected one or both of these serovars in feed material of animal origin. More detailed descriptions of the serotype distribution in feedstuff are presented in section 3.1.5.

Except for Malta, all new MS reported information on *Salmonella* in feedingstuffs. Compared to the old MS, the level of *Salmonella* contamination was high in the tested feedingstuffs of animal origin in Latvia, due to a high prevalence in fishmeal (7.3%). In Poland, *Salmonella* was not detected in fishmeal, but 1.2% of the tested samples of meat and bone meal was positive (Table SA27).

The level of *Salmonella* contamination in feedingstuffs tested in the non-MS, Norway, was low and within the ranges as in the MS.

Table SA27. *Salmonella* monitoring of feedingstuffs in new MS, 2004

	Animal origin			Vegetable origin			Compound feedstuffs			All feedstuffs		
	N	Pos	% Pos	N	Pos	% Pos	N	Pos	% Pos	N	Pos	% Pos
Feedstuffs												
Cyprus[1]	81	0	0	50	0	0	51	3	5.9	-	-	-
Czech Republic[2]	88	0	0	47	0	0	217	0	0	-	-	-
Estonia[1]	4	0	0	6	0	0	26	0	26	-	-	-
Hungary[1]	-	-	-	-	-	-	-	-	-	8,667	89	1.0
Lithuania[1]	130	1	0.8	231	5	2.2	55	1	1.8	-	-	-
Latvia[1]	614	45	7.3	261	5	1.9	76	1	1.3	-	-	-
Poland[3]	3,468	41	1.2	1,727	36	2.1	8,343	108	1.3	-	-	-
Slovakia[1]	1,705	10	0.6	955	15	1.6	1,925	4	0.2	-	-	-
Slovenia[4]	77	0	0	36	0	0	183	4	2.2	-	-	-

Note: Results were not reported from Malta.
1. Sample based data.
2. In Czech Republic, batch based data.
3. In Poland, sample and batch based data.
4. In Slovenia, feedstuffs of vegetable origin is sample based data, otherwise batch based data.

3.1.5. Salmonella serovars and phage types

The level of details available on *Salmonella* serovars and phage types along the food chain varies between countries. Serotyping of *Salmonella* isolates is done in all MS on the basis of the Kaufmann-White Scheme, and the Colindale scheme is primarily used for phage typing of *S.* Enteritidis and *S.* Typhimurium. The Netherlands classified *S.* Typhimurium with another set of phages, so with the exception of *S.* Typhimurium DT104 the distributions are not comparable. Hungary also classifies *S.* Enteritidis and *S.* Typhimurium with another set of phages that are not comparable with the Colindale scheme. Therefore, these data are not presented here.

The ten most common *Salmonella* serovars and the ten most common phage types of *S.* Enteritidis and *S.* Typhimurium are presented for humans, foodstuffs (pig meat, broiler meat, eggs), animals (cattle, pigs, *Gallus gallus*) and feedingstuffs (total for all categories). Ranking was based on data from all included MS by calculating the total number of each serovar and the percentage of isolates belonging to a particular phage type within *S.* Enteritidis and *S.* Typhimurium. For humans, the Community serovar distribution was estimated, assuming that the serovar distribution in non-serotyped isolates was the same as among the serotyped isolates in each MS. For foodstuffs and animals, only MS reporting results for at least 25 isolates per food type or animal species (monitoring isolates only) were included. The serovar and phage type distributions for each MS were based on the number of typed isolates, including non-typeable isolates.

Most MS reported a group called "other serotypes". For some MS this may include isolates belonging to the ten most common serovars in the Community. However, these have not been reported individually by the MS. The relative Community occurrence of some serovars may therefore be underestimated.

Most MS reported some data on *Salmonella* serovar distributions in foodstuffs (no data from France, Luxembourg, Malta and Portugal), animals (no data from Cyprus, Latvia, Lithuania, Luxembourg, Malta and Portugal) and feedingstuffs (no data from Czech Republic, Luxembourg and Malta).

Data on serovars in humans, foodstuffs, animals and feedingstuff from each MS is summarised in Level 3, Table SA17-SA41. Data on phage types in humans is summarised in Level 3, Table SA42 and SA43.

Serovars in humans

Most MS and Norway reported serotyping results for all the human cases recorded. Italy, Luxembourg and Poland did not provide serovar information and Greece reported serovars for only 25% of cases. Overall, 86% of the isolates from human cases in the Community were serotyped. The ten most common serovars among isolates from human cases are presented in Table SAS1.

As in previous years, *S.* Enteritidis and *S.* Typhimurium were the most commonly reported serovars from human infections in all of the reporting MS, and in Norway. Based on the data available, it is estimated that *S.* Enteritidis caused 76% and *S.* Typhimurium caused 14% of human salmonellosis in the EU-25 MS. Other serovars caused each 1% or less of the total number of cases in the EU-25.

Inclusion of the new MS increased the relative proportion of *S.* Enteritidis. In MS, the percent of *S.* Enteritidis cases ranged from 32% in France to 100% in Cyprus. For *S.* Typhimurium, the percent of cases ranged from 1.5% in Czech Republic to 32% in The Netherlands.

Section 3.1.1 includes a more detailed presentation of *S.* Enteritidis and *S.* Typhimurium in humans.

Table SAS1. Distribution of the ten most common *Salmonella* serovars in humans during 2004. The serovar distribution for each MS was based on the number of serotyped isolates. Ranking was based on the sum of all reported serovars (% isolates).

	Ranked serovars												
	Serotyped isolates	***S.* Enteritidis**	***S.* Typhimurium**	***S.* Infantis**	***S.* Virchow**	***S.* Stanley**	***S.* Newport**	***S.* Derby**	***S.* group B**	***S.* Hadar**	***S.* group D**	**Other**	**% cases serotyped**
Austria[1]	7,298	83.3	9.6	1.1	0.4	-	0.2	-	-	0.4	-	5.1	100.2
Belgium	8,535	71.2	28.8	-	-	-	-	-	-	-	-	-	89.4
Cyprus	89	100	-	-	-	-	-	-	-	-	-	-	100
Czech Republic[1]	30,724	96.9	1.5	0.3	<1	-	<1	<1	-	<1	-	1.2	100
Denmark[1]	1,538	35.5	30.4	2.1	-	2.3	2.3	1.0	-	1.0	-	25.4	100
Estonia	133	68.4	13.5	-	-	-	-	0.8	3.8	-	2.3	11.3	98.5
Finland[1]	2,248	38.7	14.5	1.6	3.6	5.1	2.7	-	-	1.2	-	32.4	100
France	6,352	32.5	26.2	-	-	-	-	-	-	-	-	41.3	100
Germany[1]	48,204	67.0	23.0	-	-	-	-	-	-	-	-	-	91
Greece[1]	372	83.1	5.4	0.3	-	-	-	-	-	-	-	11.3	24.9
Hungary	7,557	72.8	7.6	5.9	0.4	-	-	0.5	-	0.4	-	12.5	100
Italy[1]	-	-	-	-	-	-	-	-	-	-	-	-	0
Ireland[1]	403	42.9	30.8	0.2	2.5	0.7	1.5	0.5	-	1.0	-	19.9	98.3
Latvia	503	84.1	4.6	0.8	1.4	-	-	8.0	-	-	-	1.2	96.7
Lithuania	1,777	92.8	4.8	1.2	0.1	-	-	0.1	-	0.1	-	1.0	95.8
Malta	79	57	12.7	1.3	3.8	-	-	2.5	-	2.5	-	20.3	100
Norway[1]	1,567	51.5	12.8	5.6	2.6	3.8	-	-	-	-	-	23.7	100
Poland	-	-	-	-	-	-	-	-	-	-	-	-	0
Portugal[1]	691	80.3	13	-	-	-	-	-	-	-	-	6.7	100
Slovakia	12,667	88.6	1.2	-	-	-	-	-	-	-	-	10.2	100
Slovenia[1]	3,158	98.3	1.0	-	-	-	-	0.1	-	-	-	<1	97.3
Spain	5,613	69	14.6	-	-	-	-	-	6.4	0.2	5.7	4.0	79.0
Sweden[1]	3,562	40.7	11.5	-	4.4	5.4	2.0	-	-	-	-	36	100
The Netherlands	1,440	53.3	32.2	1.6	0.9	-	0.9	0.7	-	1.1	-	9.3	94.7
United Kingdom	14,476	61.7	11.4	0.7	2.2	1.0	5.3	-	-	0.9	-	16.8	100
EU-15	100,477	68	20.4	<1	0.6	<1	1	<1	<1	<1	<1	10	96.3
EU-25	157,164	76.5	13.9	0.5	<1	<1	0.6	<1	<1	<1	<1	8.4	85.5

Note: Most MS reported a group called "other serovars". Isolates belonging to the top ten serovars may be included in the group of "other serovars" for some MS. Thus, empty cells do not necessarily signify that no isolates were present. Luxembourg, Italy and Poland did not include data on human serovars. No MS reported nontypeable isolates.
1. Salmonellosis notifiable in humans.

Serovars in foodstuffs

As in 2003, *S.* Typhimurium was the predominating serovar isolated from pig meat during monitoring (24–98%) followed by *S.* Derby (1–22%) (Table SAS2). The relative occurrence of the other common serovars varied between the reporting MS. *S.* Infantis was frequently reported from pig meat in Denmark (6%) and Hungary (12%) and *S.* Ohio in pig meat from Belgium (12%). The relative occurrence of serotypes not included in Table SAS2 was less than 4%. Apart from an increasing occurrence of *S.* Infantis, the serotype distribution in pig meat in 2004 was largely comparable to the distribution in 2003.

Table SAS2. Distribution of the ten most common *Salmonella* serovars in pig meat in MS that have serotyped at least 25 monitoring isolates. The serovar distribution for each MS was based on the number of serotyped isolates, including nontypeable isolates. Ranking was based on the sum of all reported serovars (% isolates).

	Ranked serovars											
	Serotyped isolates	***S.* Typhimurium**	***S.* Derby**	***S.* Infantis**	***S.* Ohio**	***S.* Enteritidis**	***S.* Bredeney**	***S.* Rissen**	***S.* Goldcoast**	***S.* Anatum**	***S.* Bovismorbificans**	**Other serovars**
Belgium[2,3]	117	24[1]	18	1	12	3[1]	-	2	-	-	-	40
Denmark	280	34[1]	22	6	-	-	-	-	-	-	-	21
Germany	54	52[1]	18	4	2	-	2	4	4	-	2	12
Hungary	113	26[1]	21	12	-	4[1]	1	-	-	-	3	33
Ireland	79	98[1]	1	-	-	-	-	-	1	-	-	0
Italy[2]	144	55	17	2	1	3	6	1	1	6	1	9

Note: Most MS reported a group called “other serovars”. Isolates belonging to the top ten serotypes may be included in the group of “other serotypes” for some MS. Thus, empty cells do not necessarily signify that no isolates were present.

1. This serovar was a common cause of human infections in the MS, representing at least 10% of the human cases reported.
2. In Belgium and Italy, serovar data from the monitoring programmes was not specifically reported, so the serotypes distribution from the general *Salmonella* tables was included.
3. In Belgium, *Salmonella* notifiable in food.

Overall, *S.* Enteritidis was the most commonly occurring serovar isolated from the monitoring of broiler meat in 2004, followed by *S.* Infantis and *S.* Typhimurium (Table SAS3). However, the predominance of specific serovars in broiler meat varied greatly between the MS. *S.* Enteritidis dominated in broiler meat in Austria, Belgium and Latvia; *S.* Infantis in Germany and Hungary; *S.* Hadar in Cyprus and Italy; *S.* Blockley in Greece; *S.* Typhimurium in Ireland and *S.* Kentucky in the United Kingdom. Other serovars not included in the list, which were common in some MS, are presented in the footnotes for Table SAS3. The relative occurrences of all other reported serovars were less than 4%.

Table SAS3. Distribution of the ten most common *Salmonella* serovars in broiler meat in MS that have serotyped at least 25 monitoring isolates. The serovar distribution for each MS was based on the number of serotyped isolates, including nontypeable isolates. Ranking was based on the sum of all reported serovars (% isolates).

	Ranked serovars											
	Serotyped isolates	*S.* Enteritidis	*S.* Infantis	*S.* Typhimurium	*S.* Blockley	*S.* Hadar	*S.* Indiana	*S.* Kentucky	*S.* Virchow	*S.* Agona	*S.* Newport	Other serovars[3]
Austria[2]	117	32[1]	15	11[1]	2	2	5	2	1	1	-	30
Belgium[2]	105	28[1]	7	16	-	-	8	-	7	17	-	18
Cyprus[2]	42	7[1]	-	2	19	21	-	-	-	-	19	31
Germany	88	10[1]	25	14	4	2	2	-	10	-	-	33
Greece	52	2[1]	-	12	40	8	6	-	10	-	-	23
Hungary	712	5[1]	91	1[1]	-	<1	-	-	-	-	-	3
Ireland	174	13[1]	1	38[1]	-	1	-	14	1	-	-	33
Italy[2]	70	3	1	9	11	33	-	-	1	-	-	41
Latvia[2]	32	97[1]	-	-	-	-	-	-	-	-	-	3
United Kingdom	46	-	-	9[1]	-	2	11	15	-	4	-	59

Note: Most MS reported a group called “other serovars”. Isolates belonging to the top ten serotypes may be included in the group of “other serovars” for some MS. Thus, empty cells do not necessarily signify that no isolates were present.

1. This serovar was a common cause of human infections in the MS, representing usually at least 10% of the human cases reported.
2. Serovar data from the monitoring programmes was not specifically reported, so the serotypes distribution from the general Salmonella tables was included.
3. Other common serotypes from broiler meat in Austria: *S.* Kottbus (11%), *S.* Thompson (5%); Belgium: *S.* Paratyphi B (9%), *S.* Bredeney (8%); Cyprus: *S.* group C2 (11%), *S.* Braenderup (7%), *S.* Kaapstad (5%); Germany: *S.* Paratyphi B var. Java (17%); Greece: *S.* Livingstone (7%), *S.* Meleagridis (6%); Hungary: *S.* Saintpaul (6%); Ireland: *S.* Mbandaka (12%), *S.* Goldcoast (10%), *S.* Bredeney (6%); Italy: *S.* Derby (6%), *S.* Glostrup (6%); United Kingdom: *S.* Derby (9%), *S.* Ohio (9%), *S.* Thompson (7%).

Generally, table eggs are not monitored using bacteriological methods. The data available from Germany and Italy showed that *S.* Enteritidis, as in 2003 and 2002, was the predominating serovar in table eggs (Table SAS4).

Table SAS 4. Distribution of the seven most common *Salmonella* serovars in table eggs in MS that have serotyped at least 25 monitoring isolates. The serovar distribution for each MS was based on the number of serotyped isolates, including nontypeable isolates. Ranking was based on the sum of all reported serovars (% isolates).

	Ranked serovars								
	Serotyped isolates	***S.* Enteritidis**	***S.* Typhimurium**	***S.* Gallinarum**	***S.* Hillingdon**	***S.* Infantis**	***S.* Saintpaul**	***S.* Mbandaka**	**Other serovars**
Germany	43	93[1]	2[1]	2	-	-	-	2	0
Italy[2]	26	73	8	4	4	4	4	-	4

Note: Most MS reported a group called "other serovars". Isolates belonging to the top ten serotypes may be included in the group of "other serovar" for some MS. Thus, empty cells do not necessarily signify that no isolates were present.

1. In Germany, this serotype was a common cause of human infections in the MS, representing at least 10% of the human cases reported.
2. In Italy, serovar data from the monitoring programmes was not specifically reported, so the serotypes distribution from the general *Salmonella* tables was included.

Several MS provided serovar information for bovine meat in 2004, but the monitoring data was too sparse for a Community evaluation of the serovar distribution.

Serovars in animals

In cattle, *S.* Typhimurium and *S.* Dublin were the most frequently detected serovars during monitoring in 2004 (Table SAS5). The frequent occurrence of *S.* Mbandaka in German cattle in 2003 was not observed in 2004. Apart from that, the distribution in 2003 was comparable to this year's distribution.

Table SAS5. Distribution of the ten most common *Salmonella* serovars in cattle, in MS that have serotyped at least 25 monitoring isolates. The serovar distribution for each MS was based on the number of serotyped isolates, including nontypeable isolates. Ranking was based on the sum of all reported serovars (% isolates).

	Ranked serovars											
	Serotyped isolates	***S.* Typhimurium**	***S.* Dublin**	***S.* Enteritidis**	***S.* Anatum**	***S.* Altona**	***S.* Derby**	***S.* Lexington**	***S.* Weltevreden**	***S.* Mbandaka**	***S.* Newport**	**Other serovars**
Czech Republic[2,3]	26	69	-	15[1]	4	-	4	-	-	-	-	8
Denmark	65	37[1]	55	-	-	-	-	-	-	-	-	8
Finland[3]	199	91[1]	-	-	-	8	-	-	-	-	-	1
Germany[3]	274	41[1]	48	3[1]	2	-	1	-	-	<1	-	5
The Netherlands[3]	184	15[1]	46	-	8	-	2	7	6	3[2]	3	10

Note: Most MS reported a group called "other serovars". Isolates belonging to the top ten serotypes may be included in the group of "other serovar" for some MS. Thus, empty cells do not necessarily signify that no isolates were present.
1. This serotype was a common cause of human infections in the MS, representing at least 10% of the human cases reported.
2. Serovar data from the monitoring programmes was not specifically reported, so the serotypes distribution from the general *Salmonella* tables was included.
3. *Salmonella* notifiable in animals.

In pigs, as in pig meat, *S.* Typhimurium was the predominant serotype detected during monitoring in 2004 (ranging from 19-82%) followed by *S.* Derby (ranging from 6-19%) (Table SAS6).

Table SAS6. Distribution of the ten most common *Salmonella* serotypes in pigs, in MS that have serotyped at least 25 monitoring isolates. The serovar distribution for each MS was based on the number of serotyped isolates, including nontypeable isolates. Ranking was based on the sum of all reported serovars (% isolates).

	Ranked serovars											
	Serotyped isolates	S. Typhimurium	S. Derby	S. Enteritidis	S. Infantis	S. Anatum	S. Bredeney	S. Bovismorbificans	S. Panama	S. Livingstone	S. Rissen	Other serovars
Czech Republic[3]	47	62	13	17[1]	4	-	-	-	-	-	-	4
Denmark	922	70[1]	18	<1[1]	3	-	<1	<1	<1	1	<1	5
Germany[3]	109	82[1]	6	1[1]	4	-	1	-	-	-	-	7
Hungary	53	19	19	9[1]	6	-	2	6	-	-	-	40
Italy[3]	45	22	13	-	2	20	7	-	2	4	2	29
The Netherlands[3]	356	52[1]	15	-	1	8	-	1[2]	5	2	4	16

Note: Most MS reported a group called “other serovars”. Isolates belonging to the top ten serovars may be included in the group of “other serovars” for some MS. Thus, empty cells do not necessarily signify that no isolates were present.
1. This serovar was a common cause of human infections in the MS, representing at least 10% of the human cases reported.
2. Serovar data from the monitoring programmes was not specifically reported, so the serotypes distribution from the general *Salmonella* tables was included.
3. *Salmonella* notifiable in animals.

The dominant serovars isolated from *Gallus gallus* were *S.* Enteritidis (Ranging from 2-93%), *S.* Infantis (0-54%) and *S.* Typhimurium (2-20%). *S. Enteritidis* was the most common serotype in several MS, but *S.* Infantis dominated in Denmark and Hungary, *S.* Blockley in Greece, *S.* Paratyphi B var. Java in The Netherlands and *S.* Livingstone in the United Kingdom (Table SAS7). The distribution of serovars in monitoring isolates from layers and broiler were reported together.

Table SAS7. Distribution of the ten most common *Salmonella* serovars in *Gallus gallus*, in MS that have serotyped at least 25 monitoring isolates. The serotype distribution for each MS was based on the number of serotyped isolates, including nontypeable isolates. Ranking was based on the sum of serovars (% isolates) for the included MS.

	Ranked serovars											
	Serotyped isolates	**S. Enteritidis**	**S. Infantis**	**S. Typhimurium**	**S. Livingstone**	**S. Virchow**	**S. Paratyphi B var. Java**	**S. Hadar**	**S. Blockley**	**S. Senftenberg**	**S. Mbandaka**	**Other serovars**
Czech Republic[3]	101	89[1]	1	1	-	-	-	-	-	-	-	9
Denmark	66	6[1]	27	20[1]	-	-	-	-	-	-	-	47
France[2,3]	105	93[1]	-	7[1]	-	-	-	-	-	-	-	0
Germany	197	24[1]	17	13[1]	6	13	-	1	-	-	8	18
Greece[3]	92	9[1]	-	5[1]	12	-	-	1	23	4	-	46
Hungary	185	31[1]	54	5[1]	-	1	-	-	1	-	-	8
Poland	173	6[1]	13	2	-	3	-	6	-	-	5	8
Spain[2]	247	70[1]	2	2[1]	-	4[1]	-	17	-	-	-	5
The Netherlands[3]	459	11[1]	8	4[1]	1	6	27	2[2]	3	10	4[2]	24
United Kingdom[3]	675	2[1]	3	2[1]	22	4	-	-	-	12	3	54

Note: Most MS reported a group called “other serovars”. Isolates belonging to the top ten serovars may be included in the group of “other serovars” for some MS. Thus, empty cells do not necessarily signify that no isolates were present.

1. This serovar was a common cause of human infections in the MS, representing at least 10% of the human cases reported.
2. Serovar data from the monitoring programmes was not specifically reported, so the serotypes distribution from the general *Salmonella* tables was included.
3. *Salmonella* notifiable in animals.

Serovars in feedingstuffs

The serovars most commonly reported from feedingstuffs varied greatly between MS, and to a wide extent depended on the sampling strategy and type of product tested. So the ranking of serovars in Table SAS8 must be interpreted with caution. Of the ten most common serovars in feedingstuffs, *S.* Typhimurium, *S.* Enteritidis and *S.* Infantis are also among the ten most common serovars in humans. With the exception of *S.* Worthington, the ten most common serovars found in feedingstuffs in 2004 were also among the most common serotypes found in feed during 2003.

Table SAS8. Distribution of the ten most common *Salmonella* serovars in MS that have serotyped at least 25 isolates (summed for all reported feedingstuff types, excluding environmental and cleaning samples).The serovar distribution for each MS was based on the number of serotyped isolates, including nontypeable isolates. Ranking was based on the sum of all reported serovars (% isolates).

		Ranked serovars										
	Serotyped isolates	S. Montevideo	S. Typhimurium	S. Enteritidis	S. Mbandaka	S. Rissen	S. Senftenberg	S. Tennessee	S. Agona	S. Infantis	S. Worthington	Other serovars
Austria	83	40	8[1]	-	8	2	7	13	-	4	-	17
Denmark	184	49	1[1]	-	1	2	4	1	4	16	-	23
Finland	42	-	10[1]	-	21	-	5	24	-	-	-	40
Italy	43	5	7	26	5	-	2	-	2	2	-	51
Poland	30	-	60	40	-	-	-	-	-	-	-	-
Slovakia	31	10	-	3[1]	-	-	10	-	16	3	26	32
Sweden	119	3	2[1]	1[1]	17	3	12	7	18	2	-	36
United Kingdom	415	1	2[1]	-	16	44	8	1	4	1	-	23

Note: Most MS reported a group called "other serovars". Isolates belonging to the top ten serovars may be included in the group of "other serovars" for some MS. Thus, empty cells do not necessarily signify that no isolates were present.
1. This serovar was a common cause of human infections in the MS, representing usually at least 10% of the human cases reported.

Phage types of S. Enteritidis and S. Typhimurium

Information on distributions of *S*. Enteritidis and *S.* Typhimurium phage types in humans were provided by eight MS (Austria, Belgium, Denmark, Finland, Hungary, Ireland, The Netherlands and United Kingdom), in foodstuff by eight MS (Austria, Czech Republic, Denmark, Germany, Hungary, Ireland, Italy and Slovakia) and in animals by ten MS (Austria, Czech Republic, Denmark, Finland, Germany, Hungary, Italy, The Netherlands, Slovakia and United Kingdom). The Netherlands classifies *S.* Typhimurium using another set of phages, and with the exception of DT104 (the Dutch FT401 and FT506) the phage type distribution in The Netherlands is not comparable to that of other MS. Hungary also classifies *S.* Enteritidis and *S.* Typhimurium with another set of phages that are not comparable with the Colindale system; therefore data are not presented here.

The occurrence of some of the less frequently observed phage types may be underestimated, as some MS may have included them in the composite group of "other phage types".

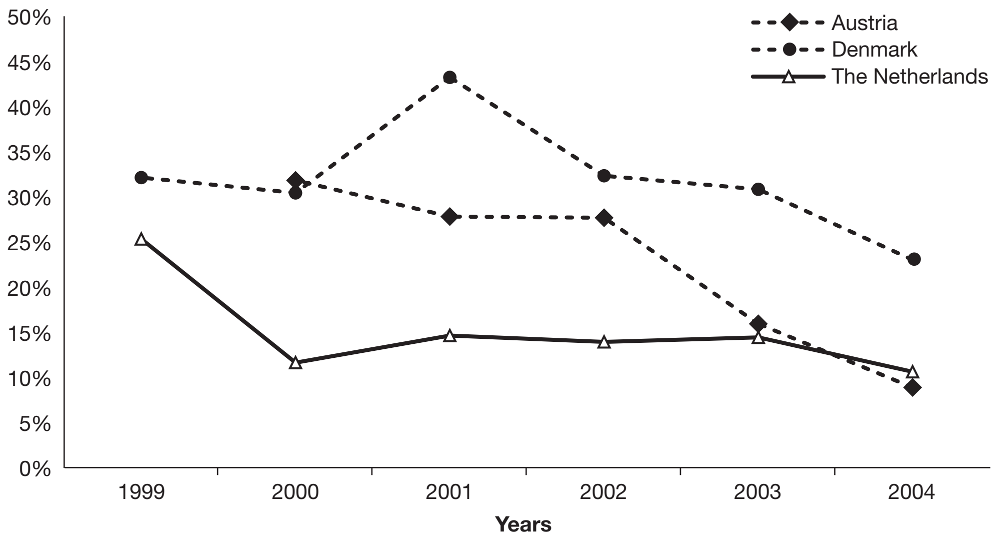
As in 2003, the most common *S.* Enteritidis phage type in humans was PT4 (22–44%), followed by PT1, PT6, PT8 and PT21. These phage types were also among those found frequently in broiler meat and *Gallus gallus* in the MS reporting results from at least 25 isolates during 2003 and 2004 (Table SAS9). Hungary did not report any human cases of PT4, but this type may be included in the relatively large group of "other phage types".

Table SAS9. Distribution of the ten most common *S.* Enteritidis phage types in humans, broiler meat and *Gallus gallus* (only MS that have typed at least 25 monitoring isolates). The phage type distribution for each MS was based on the number of typed isolates, including nontypeable and RDNC isolates. Ranking was based on the sum of all reported serovars (% isolates).

	Ranked phage types											
Humans	**Phage typed isolates**	**PT 4**	**PT 1**	**PT 21**	**PT 8**	**PT 6**	**PT 14b**	**PT 7**	**PT 6b**	**PT 6a**	**PT 1b**	**Other phage types**
Austria	6,076	41	4	12	31	3	2	<1	<1	<1	<1	6
Belgium	479	44	2	25	8	1	9	1	-	2	-	8
Denmark	546	23	14	11	21	6	-	<1	-	-	<1	24
Finland	731	27	24	13	9	5	5	-	-	3	-	8
Ireland	171	25	28	11	6	6	6	-	1	6	1	9
The Netherlands	766	29	11	19	13	8	2	-	-	4	-	14
United Kingdom	11,007	22	36	5	3	4	12	<1	-	3	-	13
Broiler meat		**PT 4**	**PT 21**	**PT 7**	**PT 6**	**PT 8**	**PT 14b**	**PT 1**	**PT 1b**	**PT 4b**	**PT 6a**	
Austria	51	37	37	2	2	6	2	4	-	-	2	8
Germany	32	56	25	-	-	3	3	-	3	3	-	0
Gallus gallus		**PT 4**	**PT 7**	**PT 6**	**PT 21**	**PT 8**	**PT 1**	**PT 36**	**PT 23**	**PT 14b**	**PT 1b**	
Austria	338	33	9	2	14	27	3	5	5	<1	-	2
Germany	54	72	-	4	9	4	7	-	-	-	-	0
The Netherlands	50	40	14	10	18	4	2	-	-	4	4	12

The dominating *S.* Typhimurium phage types among isolates from human infections were DT104 and DT120. Austria, Denmark and The Netherlands have provided data on the prevalence of *S.* Typhimurium DT104 over the last five years. All three MS report a decrease in the proportion of *S.* Typhimurium DT104 isolates, relative to all *S.* Typhimurium isolates (Figure SAS1).

Figure SAS1. Proportion of human *S.* Typhimurium isolates that are phage type DT104 in Austria, Denmark and The Netherlands



Note: Data include phage types: DT104b, DT104c, DT104h, DT104l and the Dutch phage types FT401 and FT506.

The monitoring data from foodstuffs and animals on *S.* Typhimurium phage types was too limited for a Community evaluation of the phage type distribution. Only Austria, Denmark and Germany reported this data for at least 25 monitoring isolates, and the distribution pattern varied between these MS. In Germany, DT104 comprised a relative large proportion of the *S.* Typhimurium isolates from red meat (42%), cattle (86%), *Gallus gallus* (37%) and pigs (48%). In The Netherlands, 33% of the *S.* Typhimurium isolates from pigs belonged to the types corresponding to DT104 (phage types FT506 and FT401). DT12 was predominant among *S.* Typhimurium isolates from Danish pig meat, cattle and pigs. DT120 was also commonly isolated in Danish pigs (Table SAS10).

Table SAS10. Distribution of the ten most common S. Typhimurium phage types in humans, broiler meat, pig meat, red meat (pig meat and bovine meat), cattle, *Gallus gallus* and pigs (only MS that have typed at least 25 monitoring isolates). The phage type distribution for each MS was based on the number of typed isolates, including nontypeable and RDNC isolates. Ranking was based on the sum of all reported serovars (% isolates).

		Ranked phage types										
Humans	**Phage typed isolates**	**DT 104**	**DT 120**	**DT 2**	**DT 46**	**DT 104b**	**DT 12**	**DT 1**	**DT 193**	**DT U291**	**U302**	**Other phage types**
Austria[1]	697	-	7	1	31	-	<1	3	2	16	1	28
Belgium[1]	308	24	21	-	-	-	6	-	11	-	5	38
Denmark	467	10	16	-	-	1	18	-	-	-	4	56
Finland[1]	298	16	-	-	-	4	-	19	-	-	-	42
Ireland[1]	115	41	3	2	-	20	<1	3	2	-	2	29
United Kingdom	1,615	40	2	0	<1	4	1	2	4	-	3	44
Humans		**FT 507[2]**	**FT 506[3]**	**FT 508[4]**	**FT 510[5]**	**FT 401[3]**	**FT 655**	**FT 20[6]**	**FT 80**	**FT 3**	**FT 60[7]**	
The Netherlands	463	22	19	6	5	4	4	2	2	1	<1	35
Broiler meat		**DT 7**	**DT 120**	**DT 8**	**DT 41**							
Germany	47	15	13	4	2	-	-	-	-	-	-	66
Pig meat		**DT 12**	**DT 170**	**DT 104**	**DT 120**	**DT 17**	**DT 193**	**U 288**	**DT 41**	**DT 66**	**DT 135**	
Denmark	97	25	10	7	7	6	4	4	2	2	2	11
Red meat		**DT 104**	**DT 12**	**DT 193**	**DT 120**	**U 302**	**DT 195**	**DT 208**	**DT 1**	**DT 35**	**DT 59**	
Germany	177	42	5	5	4	4	2	2	1	1	1	6
Gallus gallus		**DT 104**	**DT 10**	**DT 12**	**DT 99**	**DT 8**	**DT 46**	**DT 120**	**DT 2**	**DT 104l**	**DT 9**	
Austria	50	-	18	-	16	6	10	-	2	6	-	10
Germany	49	37	-	16	-	6	-	6	4	-	4	6

		Ranked phage types (cntd)										
Pigs	Phage typed isolates	DT 104	DT 120	DT 12	DT 170	DT 193	DT 17	U 302	DT 15a	U 288	DT 66	Other phage types
Denmark	829	6	22	21	10	4	6	4	2	3	3	14
Germany	299	48	9	2	-	4	<1	<1	1	-	-	305
Pigs		FT 507[2]	FT 506[3]	FT 90	FT 401[3]	FT 508[4]	FT 350[8]	FT 510[5]	FT 60[7]	FT 2[9]	FT 20[6]	
The Netherlands	138	35	25	12	8	7	4	4	2	<1	<1	1.4
Cattle		DT 104	DT 12	DT 17	DT 15a	DT 120	DT 170	DT 9	DT 193	DT 1	DT 12a	
Denmark	28	14	18	14	7	7	7	-	4	-	-	<1
Germany	188	86	<1	-	-	-	-	6	1	2	<1	0

Note: The Netherlands uses a different set of phages, where only some types correspond with the Colindale scheme.

1. Other common human phagetypes in Austria: DT 104l (7%), DT U (7%); Belgium: U 302 (5%); Finland: DT 40 (7%), DT 85 (5%), DT 41 (5%).
2. FT 507 corresponds mainly to ARS and DT 208a.
3. FT 506 and FT 401 corresponds to DT 104.
4. FT 508 corresponds mainly DT 193 and DT 195.
5. FT 510 corresponds mainly DT 208 and ARS also DT 193 and DT 195.
6. FT 20 corresponds to DT 124.
7. FT 60 corresponds mainly DT 12.
8. FT 350 corresponds mainly to DT 193.
9. FT 2 corresponds to DT 2 and ORS.

See Level 3, Tables SA42-43 for MS detailed information on *S.* Enteritidis and *S.* Typhimurium phage type distributions in humans.

Sources of human Salmonella infections

Salmonella continues to be one of the leading causes of human gastroenteritis in the EU. Several countries have implemented *Salmonella* surveillance programs to improve food safety for meat and eggs. There exists only limited data that provide evidence for the success of such programmes in terms of reducing human salmonellosis. However, by comparing *Salmonella* serovars and phage types isolated from humans with serovars and phage types isolated from animals and foodstuffs, it may be possible to make some inferences about the major sources of human infections.

It is generally accepted, that infections caused by *S.* Enteritidis are related to poultry (*Gallus gallus*) products and especially table eggs. In several MS, this serovar comprised more than 70% of reported cases in 2004, indicating that products of *Gallus gallus* origin are major sources of human salmonellosis in these countries. This is supported by the serovar and phage type distribution found in *Gallus gallus* and broiler meat. For instance, in Hungary, those phage types dominating among human cases (PT6, PT6b and PT7) are also the most common ones found in *Gallus gallus* and related products. Similar patterns can be seen in other MS, where phage type data from both humans, *Gallus gallus* and/or broiler meat has been reported. The phage type reporting for *Gallus gallus* does not distinguish between the table-egg and broiler production, however, since a comparison of phage types found in humans with broiler meat suggests that the majority of *S.* Enteritidis infections in most MS are not caused by broiler meat, the major source of these infections is assessed to be table eggs.

It is notable that those MS having the lowest proportion of *S.* Enteritidis cases (i.e. 33-41%) have implemented national control programmes that go further than the Zoonoses Directive (92/117/EEC) with regard to sampling and control of *Salmonella* in breeder flocks. In addition, some of these MS have surveillance programmes in the table egg producing flocks, where restrictions such as heat treatment are enforced in egg production as soon as a flock is suspected of being infected. For more information on surveillance programmes and control measures see Appendix, Table SA2-6).

S. Typhimurium was the second most frequently reported serovar in humans comprising 14% of the total number of cases in 2004. *S.* Typhimurium was also reported from all of major food-producing animals and foodstuffs i.e. *Gallus gallus* and broiler meat, pigs and pig meat, and cattle, indicating that these reservoirs are important sources of human *S.* Typhimurium infections. Overall further distinction between broiler meat, pig meat and bovine meat as sources of human infections is difficult because phage typing results for both humans and animal sources only are reported by a few MS. For Denmark and The Netherlands, however, results indicate that the greater part of the human *S.* Typhimurium infections are attributable to pig meat.

Human infections caused by *S.* Derby also appear to be related to pig meat, as this serovar was commonly found in the porcine reservoir and only infrequently reported from other sources in 2004. *S.* Derby comprised less than 1% of the total number of *Salmonella* cases in EU-25.

Other serovars on the human ten most reported include *S.* Infantis, *S.* Virchow, *S.* Newport and *S.* Hadar, which were also commonly found in broiler meat. With the exception of *S.* Infantis, these serovars were only rarely reported in other sources suggesting that the dominant source is broiler meat.

Serovar and phage type results from bovine meat were very sparse in 2004. In cattle, the dominating serovar next to *S.* Typhimurium was *S.* Dublin, which is known to be particularly associated with the bovine reservoir. Bovine meat is therefore considered to be the single most important source of these infections and occurrence in other animals or foodstuffs is also very rare. Compared to the relatively frequent occurrence of *S.* Dublin in cattle, only few infections were reported in humans in 2004.

3.1.6. Antimicrobial resistance in Salmonella

Humans

Data on the occurrence of antimicrobial resistance in *Salmonella* (*S.* Enteritidis and *S.* Typhimurium) in humans were provided by Austria, Belgium, Denmark, Estonia, Hungary, Lithuania, The Netherlands, and Norway (Table AB SA1 and AB SA2). The prevalence of resistant isolates reported from Estonia was based on a relatively small number of isolates and therefore comparison to other countries should be made with caution.

In general, the MS reported higher proportions of resistant isolates among *S.* Typhimurium than among *S.* Enteritidis. For *S.* Typhimurium in general, a relatively high level of resistance was observed for ampicillin, sulfonamide, streptomycin and tetracycline (Table AB SA1), whereas for *S.* Enteritidis the prevalence of resistant isolates was generally low for all of antimicrobials tested (Table AB SA2).

For *S.* Typhimurium (Table AB SA1), a considerable variation in the prevalence of resistant isolates reported from different MS was observed, especially for ampicillin (ranging from 17.9-66%) and tetracycline (ranging from 9.6-57.8%). Belgium, Denmark, Hungary and The Netherlands reported a relatively high prevalence of resistance to these two antimicrobials (40-66% for ampicillin and 46-57% for tetracycline). In contrast, Norway and Austria reported lower prevalence of resistant isolates for ampicillin (17.9% and 22.5% respectively) and tetracycline (20.5% and 20.8% respectively). For ciprofloxacin, a low prevalence of resistant isolates (0-0.2%) was reported by all MS, while Denmark reported 3% prevalence. For quinolones, 2-4% prevalence of resistant isolates was reported by all of 6 MS, while Hungary reported 15.9% prevalence. Resistance to quinolones (nalidixic acid), may be regarded as an indicator of emerging resistance to fluoroquinolones. Lithuania and Norway generally reported low levels of resistance to the antimicrobials tested, with the exception of ampicillin for Lithuania (43.5%). Austria, Norway and Lithuania reported high proportions of fully sensitive isolates (72.2-79.5%). Only for ciprofloxacin, ampicillin and tetracycline, results were provided by all of the eight reporting MS, whereas for several other antimicrobials, data were provided only by few MS. This limited the possibility for comparison between countries, as even within the same antimicrobial groups (classes), resistance reported for different antimicrobials may not be directly comparable.

For *S.* Enteritidis (Table AB SA2), the prevalence of resistant isolates was generally low for all antimicrobials tested. Little variation was observed between MS, except for resistance to nalidixic acid (range from 0-26.4%). Norway and Denmark reported relatively high prevalence of isolates resistant to nalidixic acid (26.4% and 16% respectively). Norway reported that a considerable proportion of *Salmonella* infections in humans were travel associated. This may have contributed to findings of resistant strains. For ciprofloxacin, seven MS reported low prevalence (0-0.3%), whereas Denmark reported 16% prevalence. Estonia reported a relatively high prevalence of resistance to sulfonamide (26.3%), however, the reporting was based on a relatively small number of isolates and results should be interpreted with caution. All six MS providing data on the number of resistance determinants for each isolate of *S.* Enteritidis, reported high proportions of fully sensitive isolates (69.7-93.8%).

Table AB SA1. Antimicrobial resistance in *S.* Typhimurium from humans, 2004

	Country		**A**	**B**	**DK**	**EST**	**H**	**LT**	**N**	**NL**
	Monitoring program		no	yes	yes	yes	no	no	yes	yes
	No of isolates available		697	308	425	8	1,598	133	78	334
Antimicrobial Group	Antimicrobials									
Aminoglycosides	Gentamicin	N	697	308	425	8	-	115	-	334
		%R	1.7	0	1	25	-	0.9	-	0
	Streptomycin	N	697	308	425	8	-	-	-	-
		%R	20.8	51.9	40	62.5	-	-	-	-
Amphenicols	Chloramphenicol	N	697	308	-	-	-	-	78	334
		%R	10.3	36	-	-	-	-	7.7	28
Cephalosporins	Cefotaxim	N	697	308	-	-	227	-	-	-
		%R	0.3	0	-	-	0	-	-	-
Fluoroquinolones	Ciprofloxacin	N	697	308	425	8	430	115	78	334
		%R	0	0	3	0	0.2	0	0	0
Penicillins	Ampicillin	N	697	308	425	8	632	115	78	334
		%R	22.5	61	40	62.5	66	43.5	17.9	49
Quinolones	Nalidixic acid	N	697	308	425	8	44	-	78	334
		%R	3.7	3.6	2	0	15.9	-	2.6	4
Sulfonamides	Sulfonamide	N	697	308	425	8	-	-	-	334
		%R	22.2	58.1	40	87.5	-	-	-	49
Tetracyclines	Tetracycline	N	697	308	425	8	545	115	78	334
		%R	20.8	57.1	46	50	57.8	9.6	20.5	54
Trimethoprim	Trimethoprim	N	697	308	425	8	-	-	-	334
		%R	3.9	21.8	8	50	-	-	-	12
Trimethoprim + Sulfonamides	Trimethoprim + Sulfamethoxazol	N	-	-	-	-	633	-	-	-
		%R	-	-	-	-	18.2	-	-	-
	Trimethoprim + Sulfonamides	N	-	-	-	8	-	115	78	-
		%R	-	-	-	50	-	4.4	6.4	-
Multiresistant isolates	fully sensitives	%	73.5	-	-	12.5	24.2	72.2	79.5	55
	resistant to 1 antimicrobial	%	3.9	-	-	0	17.5	20.0	2.6	10
	resistant to 2 antimicrobials	%	0.9	-	-	25	33.0	7.8	3.9	3
	resistant to 3 antimicrobials	%	2	-	-	0	19.8	-	11.5	9
	resistant to 4 antimicrobials	%	6.6	-	-	12.5	3.0	-	2.6	3
	resistant to >4 antimicrobials	%	13.2	-	-	50	0.6	-	0	21

Note: Only selected antimicrobials are presented in the table. The percentage of multiresistant isolates is based on all antimicrobials tested. Tables containing results for all antimicrobials tested can be found in Level 3.

Table AB SA2. Antimicrobial resistance in *S.* Enteritidis from humans, 2004

	Country		A	B	DK	EST	H	LT	N[1]	NL
	Monitoring program		no	yes	yes	yes	no	no	yes	yes
	No of isolates available		6,076	58	262	19	11,791	1,994	750	588
Antimicrobial Group	Antimicrobials									
Aminoglycosides	Gentamicin	N	6,076	58	262	19	-	1,743	-	588
		%R	0.1	0	0	0	-	0.6	-	0
	Streptomycin	N	6,076	58	262	19	-	-	-	-
		%R	0.5	0	1	0	-	-	-	-
Amphenicols	Chloramphenicol	N	6,076	58	262	19	514	1743	750	588
		%R	0.1	0	1	0	0.2	1.8	0.3	0.2
Cephalosporins	Cefotaxim	N	6,076	58	-	-	2,364	-	-	-
		%R	0	0	-	-	0.2	-	-	-
Fluoroquinolones	Ciprofloxacin	N	6,076	58	262	19	3,591	1,743	750	588
		%R	0	0	16	0	0.3	0.1	0.1	0
Penicillins	Ampicillin	N	6,076	58	262	19	5,281	1,743	750	588
		%R	1.8	3.4	2	0	5	6.4	5.6	2.7
Quinolones	Nalidixic acid	N	6,076	58	262	19	480	-	750	588
		%R	4	3.4	16	0	7.9	-	26.4	12.8
Sulfonamides	Sulfonamide	N	6,076	58	262	19	-	-	-	588
		%R	0.7	0	1	26.3	-	-	-	0.7
Tetracyclines	Tetracyclin	N	6,076	58	262	19	4,344	1,743	750	588
		%R	0.7	0	2	0	4.1	5.6	2.8	0.4
Trimethoprim	Trimethoprim	N	6,076	58	262	19	-	1,743	-	588
		%R	0.4	0	1	0	-	0.6	-	0.3
Trimethoprim + Sulfonamides	Trimethoprim + Sulfamethoxazol	N	-	-	-	-	5,273	-	-	-
		%R	-	-	-	-	6.8	-	-	-
	Trimethoprim + Sulfonamides	N	-	-	-	19	-	1743	750	-
		%R	-	-	-	0	-	1.6	2	-
Multiresistant isolates	fully sensitives	%	93.8	-	-	73.7	77.8	84.9	69.7	85
	resistant to 1 antimicrobial	%	5.3	-	-	26.3	10.2	11.9	25.2	13
	resistant to 2 antimicrobials	%	0.1	-	-	0	4.3	2.5	3.3	1
	resistant to 3 antimicrobials	%	0.4	-	-	0	1.5	0.3	1.6	1
	resistant to 4 antimicrobials	%	0.2	-	-	0	0.1	0.3	0.1	0
	resistant to >4 antimicrobials	%	0.1	-	-	0	0.1	0.1	0	0

Note: Only selected antimicrobials are presented in the table. The percentage of multiresistant isolates is based on all antimicrobials tested. Tables containing results for all antimicrobials tested can be found in Level 3.
1. In Norway, 54 isolates were domestically acquired.

Food

Data on the occurrence of antimicrobial resistance in *Salmonella* (*S.* Enteritidis and *S.* Typhimurium) in food (bovine meat, pig meat, broiler meat and other poultry meat) were provided by Austria, Belgium, Cyprus, Estonia, France, Germany, Italy, Latvia, Lithuania, Slovakia, Slovenia, Spain, The Netherlands and United Kingdom (Table AB SA3-SA6). Most MS reported data on antimicrobial resistance in *Salmonella enterica* ssp. *enterica* without dividing them into serotypes. For this reason combined reporting of data were selected for this summary.

Bovine meat

Seven MS provided data on antimicrobial resistance in *Salmonella* from bovine meat (Table AB SA3). Except for data provided by France, Germany and Italy, the reporting from four MS was based on a low number of isolates (<7), which hampered valid comparison of prevalence between MS. In general, the highest prevalence of resistant isolates was observed for streptomycin, ampicillin, tetracycline and trimethoprim. The prevalence of resistance to ampicillin and sulfonamide in isolates reported for France (4.4% and 15.9% respectively) was low compared to the prevalence reported for Germany (46.9% and 58.8%) and Italy (36.7% and 43.3%). Italy also reported higher prevalence of resistance to streptomycin and nalidixic acid than France and Germany. Resistance to fluoroquinolones was generally low, and for tetracycline only minor variation between the three MS was observed. In general, low proportions of fully sensitive isolates were reported.

Pig meat

Eleven MS provided data on antimicrobial resistance in *Salmonella* from pig meat (Table AB SA4). Except for data provided by Belgium, France and Italy, the reporting from eight MS was based on a low number of isolates (<7), which hampered valid comparison of prevalence between MS. In general, the highest prevalence of resistant isolates was observed for ampicillin, streptomycin, sulfonamide and tetracycline. Compared to France and Italy, Belgium reported lower prevalence of resistance to streptomycin and tetracycline, whereas Italy reported higher prevalence of resistance to sulfonamide and ampicillin compared to France and Belgium.

Broiler meat

Fourteen MS provided data on antimicrobial resistance in *Salmonella* from broiler meat (Table AB SA5). For five MS (Greece, Lithuania, Slovakia, Slovenia and Spain) reporting was based on a relatively low number of isolates (<25), which hampered the comparison between MS. In general, the highest prevalence of resistant isolates was reported for tetracycline and sulfonamide, while the prevalence resistance to ampicillin, streptomycin and nalidixic was slightly lower. High level resistance to fluoroquinolones was near absent among the reporting MS.

Table AB SA3. Antimicrobial resistance in *Salmonella* from bovine meat, 2004

	Country		A	B	EST	F	D	I	NL
	Monitoring program		yes	yes	yes	yes	no	no	yes
	No of isolates available		1	7	4	69	303	95	4
Antimicrobial group	Antimicrobial								
Aminoglycosides	Gentamicin	N	1	-	4	69	303	60	4
		%R	0	-	0	1.5	2.6	0	0
	Streptomycin	N	1	7	4	69	303	60	-
		%R	0	43	0	34.8	45.6	58.3	-
Amphenicols	Chloramphenicol	N	1	7	4	69	303	60	4
		%R	0	0	0	5.8	21.1	15	25
Cephalosporin	Cefotaxim	N	1	-	4	69	-	60	-
		%R	0	-	0	0	-	0	-
Fluoroquinolones	Ciprofloxacin	N	1	7	4	-	303	60	4
		%R	0	0	0	-	0.3	0	0
	Enrofloxacin	N	-	-	3	69	-	60	-
		%R	-	-	0	0	-	0	-
Penicillins	Ampicillin	N	1	7	4	69	303	60	4
		%R	0	29	0	4.4	46.9	36.7	75
Quinolones	Nalidixic acid	N	1	7	4	69	303	60	4
		%R	0	14	0	0	2.6	21.7	0
Sulfonamides	Sulfonamide	N	1	7	4	69	303	60	-
		%R	0	57	0	15.9	58.8	43.3	-
Tetracyclines	Tetracyclin	N	1	7	4	69	303	60	4
		%R	0	43	0	44.9	49.2	55	50
Trimethoprim	Trimethoprim	N	1	7	4	-	303	57	4
		%R	0	29	0	-	13.2	10.5	25
Trimethoprim + Sulfonamides	Trimethoprim + Sulfonamide	N	-	7	4	69	303	-	4
		%R	-	29	0	2.9	13.2	-	25
Multiresistant isolates	fully sensitives	%	100	29	75	5.8	32.3	19.2	-
	resistant to 1 antimicrobial	%	-	14	25	34.8	17.5	17.3	-
	resistant to 2 antimicrobials	%	-	29	0	7.3	1.7	3.9	-
	resistant to 3 antimicrobials	%	-	0	0	8.7	5.6	5.8	-
	resistant to 4 antimicrobials	%	-	0	0	2.9	11.9	19.2	-
	resistant to >4 antimicrobials	%	-	29	0	4.4	31.0	34.6	-

Note: Only selected antimicrobials are presented in the table. The percentage of multiresistant isolates is based on all antimicrobials tested. Tables containing results for all antimicrobials tested can be found in Level 3.

Table AB SA4. Antimicrobial resistance in *Salmonella* from pig meat, 2004

	Country		A	B	CY	EST	F	I	LV	LT	SK	ES	NL
	Monitoring program		yes	yes	yes	yes	yes	no	no	yes	yes		yes
	No of isolates available		2	128	1	2	166	772	4	1	1	1	7
Antimicrobial Group	Antimicrobials												
Aminoglycosides	Gentamicin	N	2	-	1	2	166	415	4	1	1	1	7
		%R	0	-	0	0	0.6	1.5	25	0	0	0	0
	Streptomycin	N	2	128	1	2	166	416	2	1	1	1	-
		%R	0	34	0	100	57.2	46.4	100	0	100	0	-
Amphenicols	Chloramphenicol	N	2	128	1	2	166	415	2	1	1	1	7
		%R	0	10	0	100	24.1	15.7	0	0	0	0	0
Cephalosporins	Cefotaxim	N	2	-	-	2	166	416	3	-	1	-	-
		%R	0	-	-	0	0	0.5	0	-	0	-	-
Fluoroquinolones	Ciprofloxacin	N	2	128	1	2	-	416	2	1	1	1	7
		%R	0	0	0	0	-	0.2	0	0	0	0	0
	Enrofloxacin	N	-	-	-	2	166	416	-	-	-	-	-
		%R	-	-	-	0	0	0.7	-	-	-	-	-
Penicillins	Ampicillin	N	2	128	1	2	166	416	4	1	1	1	7
		%R	0	27	0	100	27.1	36.8	75	0	0	0	0
Quinolones	Nalidixic acid	N	2	128	1	2	166	416	3	1	1	1	7
		%R	50	4	0	0	3.1	6.01	0	0	0	0	0
Sulfonamides	Sulfonamide	N	2	128	-	2	166	416	-	-	1	1	-
		%R	0	50	-	100	49.4	63.9	-	-	0	0	-
Tetracyclines	Tetracyclin	N	2	128	1	2	166	415	0	1	1	1	7
		%R	0	33	0	100	78.9	56.9	-	0	0	100	29
Trimethoprim	Trimethoprim	N	2	128	-	2	-	409	2	1	1	-	7
		%R	0	22	-	0	-	17.6	50	0	0	-	0
Trimethoprim + Sulfonamides	Trimethoprim + Sulfonamide	N	-	128	1	2	166	-	2	1	1	-	7
		%R	-	21	0	0	12.7	-	50	2	0	-	0
Multiresistant isolates	fully sensitives	%	50	36	100	0	0	21.2	25	100	-	-	-
	resistant to 1 antimicrobial	%	50	25	0	0	21	19.1	-	-	100	100	-
	resistant to 2 antimicrobials	%	-	6	-	0	11.4	6.3	50	-	-	-	-
	resistant to 3 antimicrobials	%	-	9	-	0	22.2	13.9	-	-	-	-	-
	resistant to 4 antimicrobials	%	-	12	-	0	7.2	14.4	-	-	-	-	-
	resistant to >4 antimicrobials	%	-	12	-	100	21.6	25.1	25	-	-	-	-

Note: Only selected antimicrobials are presented in the table. The percentage of multiresistant isolates is based on all antimicrobials tested. Tables containing results for all antimicrobials tested can be found in Level 3.

Table AB SA5. Antimicrobial resistance in *Salmonella* from broiler meat, 2004

	Country		A	B	CY	EST	F	D	GR	I	LT	SK	SLO	ES	NL	UK
	Monitoring program		yes	yes	yes	yes	yes	no	no	no	no	yes	no	no	yes	yes
	No of isolates available		148	172	41	25	62	202	14	421	9	4	19	7	112	40
Antimicrobial Group	Antimicrobials															
Aminoglycosides	Gentamicin	N	148	-	11	25	62	202	14	366	9	4	19	7	112	40
		%R	0	-	0	0	0	0	0	0.6	0	0	0	0	0	0
	Streptomycin	N	148	172	12	25	62	202	14	367	9	4	19	7	-	40
		%R	15.5	46	0	16	33.9	18.8	35.7	21.8	0	0	0	0	-	13.6
Amphenicols	Chloramphenicol	N	148	172	35	25	62	202	14	367	9	4	19	7	112	40
		%R	2.7	12	2.8	4	8.1	1	28.6	2.2	0	0	0	43	2	4.5
Cephalosporins	3rd generation cephalosporins	N	-	-	-	-	-	-	-	-	-	-	19	4	112	-
		%R	-	-	-	-	-	-	-	-	-	-	0	0	11	-
	Cefotaxim	N	148	-	-	25	62	-	10	367	-	4	-	-	-	-
		%R	1.4	-	-	0	3.2	-	0	3	-	0	-	-	-	-
Fluoroquinolones	Ciprofloxacin	N	148	172	38	25	-	202	14	367	9	4	19	7	112	-
		%R	0	0	0	0	-	0	0	0	0	0	0	0	0	-
	Enrofloxacin	N	-	-	-	25	62	-	-	366	-	-	19	3	-	-
		%R	-	-	-	0	0	-	-	5.2	-	-	0	0	-	-
Penicillins	Ampicillin	N	148	172	35	25	62	202	14	367	9	4	19	7	112	40
		%R	8.8	41	11.4	8	12.9	22.3	7.14	24.5	0	0	10.5	14	54	9.1
Quinolones	Nalidixic acid	N	148	172	35	25	62	202	14	367	9	4	19	7	112	40
		%R	18.9	27	5.7	36	9.7	16.3	35.7	31.6	11	25	5.3	57	46	0
Sulfonamides	Sulfonamide	N	148	172	35	25	62	202	14	366	-	4	19	4	-	40
		%R	14.2	55	17	36	12.9	31.2	7.14	34.4	-	0	0	0	-	13.6
Tetracyclines	Tetracyclin	N	148	172	35	25	62	202	14	365	9	4	19	7	112	40
		%R	17.6	20	45.7	40	51.6	24.3	35.7	29.3	11	0	0	14	11	6.8
Multiresistant isolates	fully sensitives	%	74.3	31	45.7	24	9.7	56.4	50	44.3	88	75	84.2	29	-	50
	resistant to 1 antimicrobial	%	5.4	18	20	32	33.9	11.9	14.3	19.9	22	25	15.8	43	-	9.1
	resistant to 2 antimicrobials	%	0.7	6	34.2	4	9.7	4	0	7.8	-	-	0	14	-	20.5
	resistant to 3 antimicrobials	%	2.7	10	0	4	1.6	2.5	14.3	5.5	-	-	0	-	-	4.5
	resistant to 4 antimicrobials	%	14.2	16	0	16	6.5	5	0	7.8	-	-	0	14	-	4.5
	resistant to >4 antimicrobials	%	2.7	20	0	20	12.9	20.2	21.4	14.7	-	-	0	-	-	6.8

Note: Only selected antimicrobials are presented in the table. The percentage of multiresistant isolates is based on all antimicrobials tested. Tables containing results for all antimicrobials tested can be found in Level 3.

Some MS reported relatively high levels of resistance to more antimicrobials, Belgium (streptomycin 46%, ampicillin 41%, sulfonamide 55%), The Netherlands (ampicillin 54%, nalidixic acid 46%) and France (tetracycline 51.6%, streptomycin 33.9). In contrast, Austria reported a high proportion of fully sensitive isolates (74.3%) and a low proportion of isolates resistant to more than four antimicrobials (2.7%). Some MS that reported a high prevalence of fully sensitive isolates, also reported a relative high proportion of isolates resistant to more than four antimicrobials e.g. Germany (56.4% fully sensitive isolates and 20.2% resistant to >4 antimicrobials) and Italy (44.3% fully sensitive isolates and 14.7% resistant to >4 antimicrobials).

Other poultry meat

Eight MS provided data on antimicrobial resistance in *Salmonella* from other poultry meat (Table AB SA6). Four MS (Estonia, Italy, Slovakia and Spain), reported on a relatively low number of isolates (<12). A relatively high level of resistance to streptomycin (32.8-60.9%) and tetracycline (35.9-60.9%) was reported by Austria, France and Germany. A lower level of resistance to gentamicin (7.8-25%) was reported by Austria, Germany and Italy. This is in contrast to the near absence of gentamicin resistance reported for broiler meat. Resistance to quinolones was common, whereas resistance to fluoroquinolones was low. Austria and Latvia reported high proportions of fully sensitive isolates (45.3% and 81% respectively) and low proportions of isolates resistant to >4 antimicrobials (14.1% and 0% respectively), whereas Germany reported 14.3% fully sensitive isolates and 36.7% of isolates resistant to >4 antimicrobials.

Animals

Data on the occurrence of antimicrobial resistance in *Salmonella* (*S.* Enteritidis and *S.* Typhimurium) in animals (cattle, pigs, *Gallus gallus* and turkeys) were provided by Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Norway, Poland, Slovakia, Slovenia, Spain, Sweden, The Netherlands and United Kingdom (Table AB SA7-SA10 and Level 3, Table AB SA7-SA14). For animals, most MS reported data on antimicrobial resistance in different *Salmonella* serotypes separately. For this summary, data on *S.* Enteritidis and *S.* Typhimurium were selected.

Cattle

Sixteen MS and Norway provided data on antimicrobial resistance in *S.* Enteritidis and *S.* Typhimurium from cattle (Table AB SA7 and Level 3, Table AB SA7).The reporting for *S.* Typhimurium from eleven of 17 reporting MS was based on a low number of isolates (<13). For *S.* Enteritidis from cattle, all reports were based on less than 14 isolates. In general, antimicrobial resistance was widespread in *S.* Typhimurium isolates from cattle. The highest prevalence of resistant isolates was observed for ampicillin (up to 89%), sulfonamide (up to 96.3%), tetracycline (up to 91.5%) and streptomycin (up to 89.9%). This high level of resistance was reflected in the proportions of isolates resistant to >4 antimicrobials, where high proportions were reported by several MS, e.g. Germany (87.8%), Italy (76.9%), United Kingdom (61%) and France (59.3%). Resistance to cephalosporins and fluoroquinolones was near absent, except for a 3.7% prevalence of resistance to enrofloxacin reported by France. For quinolones some variation in prevalence between countries was observed ranging from 0 to 14.8% (France) and 19.4% (Belgium). The level of resistance in isolates of *S.* Enteritidis was generally low, and high proportions of fully susceptible isolates were reported.

Table AB SA6. Antimicrobial resistance in *Salmonella* from other poultry meat, 2004

	Country		A	EST	F	D	I	LV[1]	SK	ES
	Monitoring program		yes	yes	yes	no	no	yes	yes	yes
	No of isolates available		64	8	23	49	12	221	1	10
Antimicrobial Group	Antimicrobial									
Aminoglycosides	Gentamicin	N	64	8	23	49	12	5	1	-
		%R	7.8	0	0	18.4	25	0	0	-
	Streptomycin	N	64	8	23	49	12	18	1	-
		%R	32.8	12.5	60.9	44.9	50	6	100	-
Amphenicols	Chloramphenicol	N	64	8	23	49	12	20	1	10
		%R	10.9	0	4.4	32.7	58.3	5	100	50
Cephalosporins	Cefotaxim	N	64	8	23	-	12	20	1	-
		%R	0	0	0	-	0	0	0	-
Fluoroquinolones	Ciprofloxacin	N	64	8	-	49	12	17	1	10
		%R	0	0	-	2	0	0	0	0
	Enrofloxacin	N	-	6	23	-	12	-	-	10
		%R	-	0	4.4	-	8.3	-	-	0
Penicillins	Ampicillin	N	64	8	23	49	12	19	1	10
		%R	21.9	62.5	21.7	53.1	58.3	0	100	20
Quinolones	Nalidixic acid	N	64	8	23	49	12	6	1	-
		%R	32.8	0	13	38.8	66.7	0	100	-
Sulfonamides	Sulfonamide	N	64	8	23	49	12	-	1	-
		%R	23.4	37.5	17.4	61.2	75	-	100	-
Tetracyclines	Tetracyclin	N	64	8	23	49	12	17	1	10
		%R	35.9	50	60.9	46.9	50	0	100	50
Trimethoprim + Sulfonamides	Trimethoprim + Sulfonamide	N	-	8	23	49	-	6	1	-
		%R	-	25	8.7	10.2	-	17	100	-
			-	-	-	-	-	-	-	-
Multiresistant isolates	fully sensitives	%	45.3	12.5	13	14.3	9.1	81	-	-
	resistant to 1 antimicrobial	%	15.6	37.5	21.7	8.2	9.1	5	-	-
	resistant to 2 antimicrobials	%	7.8	25	26.1	6.1	9.1	14	-	-
	resistant to 3 antimicrobials	%	7.8	0	4.4	12.2	0	0	-	-
	resistant to 4 antimicrobials	%	9.4	0	4.4	22.5	9.1	0	-	-
	resistant to >4 antimicrobials	%	14.1	25	17.4	36.7	63.6	0	100	-

Note: Only selected antimicrobials are presented in the table. The percentage of multiresistant isolates is based on all antimicrobials tested. Tables containing results for all antimicrobials tested can be found in Level 3.
1. In Latvia, isolates from poultry meat.

Table AB SA7. Antimicrobial resistance in *S.* Typhimurium from cattle, 2004

	Country		A	B	CZ	DK	EST	FIN	F	D	GR
	Monitoring program		no	no	yes	yes	yes	yes	yes	no	no
	No of isolates available		4	31	1	28	4	12	27	188	1
Antimicrobial Group	Antimicrobial										
Aminoglycosides	Gentamicin	N	4	31	1	28	2	12	27	188	1
		%R	0	0	0	0	0	0	0	1.6	0
	Streptomycin	N	4	31	1	28	2	12	27	188	-
		%R	75	77.4	0	39	50	0	74.1	89.9	-
Amphenicols	Chloramphenicol	N	4	31	1	28	2	12	27	188	1
		%R	75	64.5	0	14	0	0	59.3	72.9	0
Cephalosporin	3rd generation cephalosporins	N	-	-	-	-	-	12	-	-	-
		%R	-	-	-	-	-	0	-	-	-
	Cefotaxim	N	4	-	-	-	2	-	27	-	1
		%R	0	-	-	-	0	-	0	-	0
	Ceftiofur	N	-	31	-	28	-	-	-	188	-
		%R	-	0	-	0	-	-	-	0	-
Fluoroquinolones	Ciprofloxacin	N	4	-	-	28	2	-	-	188	1
		%R	0	-	-	0	0	-	-	0.5	0
	Enrofloxacin	N	-	31	1	-	2	12	27	-	-
		%R	-	0	0	-	0	0	3.7	-	-
Penicillins	Ampicillin	N	4	31	1	28	2	12	27	188	1
		%R	75	83.9	0	32	0	0	66.7	88.3	0
Quinolones	Nalidixic acid	N	4	31	-	28	2	12	27	188	1
		%R	0	19.4	-	0	0	0	14.8	0.5	0
Sulfonamides	Sulfonamide	N	4	31	-	28	2	12	27	188	1
		%R	75	90.3	-	32	50	0	66.7	96.3	0
Tetracyclines	Tetracyclin	N	4	31	1	28	2	-	27	188	1
		%R	100	71	0	21	50	-	85.2	88.8	100
Trimethoprims	Trimethoprim	N	4	-	-	28	1	12	-	188	1
		%R	0	-	-	4	0	0	-	16	0
Trimethoprims + Sulfonamides	Trimethoprim + Sulfonamide	N	-	2	1	-	2	-	27	188	1
		%R	-	6.5	0	-	0	-	7.4	16	0
Multiresistant isolates	fully sensitives	%	-	9.7	100	-	50	100	0	3.7	-
	resistant to 1 antimicrobial	%	25	-	-	-	0	0	11.1	6.4	100
	resistant to 2 antimicrobials	%	-	-	-	-	0	0	11.1	0	-
	resistant to 3 antimicrobials	%	-	-	-	-	50	0	3.7	1.1	-
	resistant to 4 antimicrobials	%	-	-	-	-	0	0	3.7	1.1	-
	resistant to >4 antimicrobials	%	75	-	-	-	0	0	59.3	87.8	-

Table AB SA7. Antimicrobial resistance in *S.*Typhimurium from cattle, 2004 (cntd.)

	Country		H	IRL	I	N	SK	S	NL	UK
	Monitoring program		no	no	no	yes	no	yes	no	yes
	No of isolates available		4	5	113	2	10	6	13	90
Antimicrobial Group	Antimicrobial									
Aminoglycosides	Gentamicin	N	4	-	82	2	8	6	13	90
		%R	0	-	1.2	0	0	0	0	0
	Streptomycin	N	4	-	82	2	8	6	-	90
		%R	50	-	89.0	0	87	66.6	-	68
Amphenicols	Chloramphenicol	N	4	-	82	2	8	6	13	90
		%R	75	-	69.5	0	87	66.6	38	62
Cephalosporin	3rd generation cephalosporins	N	-	-	-	-	-	-	13	-
		%R	-	-	-	-	-	-	0	-
	Cefotaxim	N	-	-	82	-	8	-	-	90
		%R	-	-	0	-	0	-	-	0
	Ceftiofur	N	4	-	-	2	-	6	-	-
		%R	0	-	-	0	-	0	-	-
Fluoroquinolones	Ciprofloxacin	N	0	-	81	-	8	-	13	90
		%R	-	-	0	-	0	-	0	0
	Enrofloxacin	N	4	5	82	2	-	6	-	-
		%R	0	0	0	0	-	0	-	-
Penicillins	Ampicillin	N	4	-	82	2	8	6	13	90
		%R	75	-	89.0	0	87	66.6	54	69
Quinolones	Nalidixic acid	N	4	-	82	2	8	6	13	90
		%R	0	-	6.1	0	87	0	0	1
Sulfonamides	Sulfonamide	N	4	-	81	2	8	6	13	90
		%R	75	-	90.1	0	87	66.6	69	76
Tetracyclines	Tetracyclin	N	4	4	82	2	8	6	13	90
		%R	75	50	91.5	0	87	66.6	62	84
Trimethoprims	Trimethoprim	N	0	2	82	2	8	6	13	90
		%R	-	0	11.0	0	0	0	15	30
Trimethoprims + Sulfonamides	Trimethoprim + Sulfonamide	N	4	4	-	-	8	-	-	-
		%R	25	0	-	-	0	-	-	-
Multiresistant isolates	fully sensitives	%	25	-	6.4	100	13	33.3	31	11
	resistant to 1 antimicrobial	%	-	-	0	-	-	-	8	12
	resistant to 2 antimicrobials	%	-	-	0	-	-	-	0	4
	resistant to 3 antimicrobials	%	-	-	1.3	-	-	-	15	3
	resistant to 4 antimicrobials	%	-	-	15.4	-	-	-	8	8
	resistant to >4 antimicrobials	%	75	-	76.9	-	87	66.6	38	

Note: Only selected antimicrobials are presented in the table. The percentage of multiresistant isolates is based on all antimicrobials tested. Tables containing results for all antimicrobials tested can be found in Level 3.

Pigs

Sixteen MS and Norway provided data on antimicrobial resistance in *S.* Enteritidis and *S.* Typhimurium from pigs (Table AB SA8 and Level 3, Table AB SA9). For twelve of 19 MS providing data for *S.* Typhimurium, the reporting was based on a small number of isolates(<11 isolates). For *S.* Enteritidis from pigs, all reports were based on one to four isolates. In general, the highest level of resistance in *S.* Typhimurium from pigs was observed for ampicillin (up to 78.6%), sulfonamide (up to 90%), tetracycline (up to 96.7%) and streptomycin (up to 82.6%). In contrast, among countries testing for susceptibility to fluoroquinolones and cephalosporins, resistance to these groups of antimicrobials were near absent, and with few exceptions, the level or resistance to for quinolones was generally very low (0-3.3%). For antimicrobials frequently used for pigs i.e. ampicillin, sulfonamide, tetracycline and streptomycin, a considerable variation in prevalence of resistant isolates was observed among the reporting MS. Germany, Italy, Spain and United Kingdom reported high levels of resistance to ampicillin, sulfonamide, tetracycline and streptomycin (ranging from 60 to 97% prevalence). Slightly lower prevalences (ranging from 50 to 73%) were reported by Belgium and the Netherlands, while the lowest level of resistance to these antimicrobials was reported by Denmark (ranging from 22-40%).

The high level of resistance observed for *S.* Typhimurium from pigs was reflected in the proportions of isolates resistant to >4 antimicrobials, where relatively high proportions were reported by several MS, e.g. Germany (58.5%), Italy (44.4%), United Kingdom (71%) and Spain (39.9%). In contrast, the level of resistance in isolates of *S.* Enteritidis in pigs was generally low (Level 3, Table AB SA9), although this should be interpreted with care as none of the reports were based on more than 5 isolates.

Gallus gallus

Twenty MS provided data on antimicrobial resistance in *S.* Enteritidis and *S.* Typhimurium from *Gallus gallus* (Table AB SA9-10). For nine of the14 MS providing data for *S.* Typhimurium, the reporting was based on a small number of isolates(<12 isolates). Data on *S.* Enteritidis from *Gallus gallus* were provided by 18 MS, and only four MS reported on small numbers of isolates (<14). Thus, especially for *S.* Typhimurium, MS reported on very few isolates for *Gallus gallus*, which limited the possibility of making valid comparisons of prevalence between MS. Reporting of data for *S.* Enteritidis was more frequent for *Gallus gallus* among MS, than in other animal species. In general, lower levels of antimicrobial resistance were reported for isolates of *S.* Enteritidis than for *S.* Typhimurium. In general, the highest level of resistance was reported for ampicillin (up to 63.3%), sulfonamide (up to 81.6%), tetracycline (up to 59.2%) and streptomycin (up to 63.3%) in *S.* Typhimurium, whereas for *S.* Enteritidis only the reported prevalence for quinolones were high (up to 96.2%). High proportion of fully sensitive isolates was reported by Austria (86%) in *S.* Typhimurium and for Austria (92.9%), Belgium (95.8), Greece (76.9%), and Slovakia (98%) in S. Enteritidis.

Turkeys

Nine MS provided data on antimicrobial resistance in *S.* Typhimurium from turkeys (Level 3, Table AB SA10). For five MS, the reporting was based on a small number of isolates (<3 isolates). In general, the prevalence of resistance to several antimicrobials in isolates from turkeys was high compared to isolates from other animal species. The highest level of resistance was observed for ampicillin (up to 94.1%), nalidixic acid (up to 81.8%), sulfonamide (up to 100%), streptomycin (up to 91.2%) and tetracycline (up to 96.4%). High prevalence of resistance to several antimicrobials was reported by Germany and Italy followed by United Kingdom and France. Germany also reported a high proportion (91.2%) of isolates resistant to >4 antimicrobials. Italy and United Kingdom reported high prevalence of resistance to nalidixic acid (81.8% and 60% respectively), whereas resistance to fluoroquinolones was low.

Table AB SA8. Antimicrobial resistance in *S.* Typhimurium from pigs 2004

	Country		A	B	CZ	DK	FIN	F	D	H	IRL	I
	Monitoring program		no	no	yes	yes	yes	yes	no	no	no	no
	No of isolates available		2	175	5	814	3	6	299	3	2	430
Antimicrobial Group	Antimicrobial											
Aminoglycosides	Gentamicin	N	2	175	5	814	3	6	299	3	-	216
		% R	0	0	0	1	0	0	6	0	-	1.4
	Streptomycin	N	2	175	5	814	3	6	299	3	-	216
		% R	100	50.3	100	37	33.3	50	82.6	66.7	-	70.8
Amphenicols	Chloramphenicol	N	2	175	5	814	3	6	299	3	-	215
		% R	100	42.9	100	9	33.3	33.3	46.2	66.7	-	32.6
Cephalosporins	3rd generation cephalosporins	N	-	-	-	-	3	-	-	-	-	-
		% R	-	-	-	-	0	-	-	-	-	-
	Ceftiofur	N	-	175	-	814	-	-	299	3	-	-
		% R	-	1.1	-	0	-	-	0	0	-	-
	Cephalothin	N	-	-	-	814	-	-	-	3	-	210
		% R	-	-	-	1	-	-	-	0	-	3.3
Fluoroquinolones	Ciprofloxacin	N	2	-	-	814	-	-	299	0	-	216
		% R	0	-	-	1	-	-	0	-	-	0.5
	Enrofloxacin	N	-	175	5	-	3	6	-	3	2	216
		% R	-	0	0	-	0	0	-	0	0	0.9
Penicillins	Ampicillin	N	2	175	5	814	3	6	235	3	-	216
		% R	100	58.9	100	22	33.3	33.3	78.6	66.7	-	66.2
Quinolones	Nalidixic acid	N	2	175	-	814	3	6	5	3	-	216
		% R	0	2.3	-	1	0	0	1.7	0	-	10.2
Sulfonamides	Sulfonamide	N	2	175	-	814	3	6	269	3	-	216
		% R	100	64	-	38	33.3	50	90	66.7	-	81.9
Tetracyclines	Tetracyclin	N	2	175	5	814	-	6	233	3	1	216
		% R	100	64.6	100	40	-	83.3	77.9	66.7	100	80.6
Trimethoprims	Trimethoprim	N	2	-	-	814	3	-	80	0	0	207
		% R	0	-	-	6	0	-	26.8	-	0	20.3
Trimethoprims + Sulfonamides	Trimethoprim + Sulfonamide	N	-	49	5	-	-	6	80	3	2	-
		% R	-	28	100	-	-	16.7	26.8	0	50	-
Multiresistant isolates	fully sensitives	%	-	25	-	-	66.7	0	7	33.3	-	6.4
	resistant to 1 antimicrobial	%	-	-	-	-	0	50	7.4	-	-	10.1
	resistant to 2 antimicrobials	%	-	-	-	-	0	0	2.7	-	-	3.7
	resistant to 3 antimicrobials	%	-	-	-	-	0	16.7	7	-	-	12.2
	resistant to 4 antimicrobials	%	-	-	100	-	0	0	17.4	-	-	23.3
	resistant to >4 antimicrobials	%	100	-	-	-	33.3	33.3	58.5	66.7	-	44.4

Table AB SA8. Antimicrobial resistance in *S.* Typhimurium from pigs 2004 (cntd.)

	Country		L	N	PL	SK	SLO	ES	S	NL	UK
	Monitoring program			yes	no	no	no	no	yes	yes	yes
	No of isolates available			3	11	1	1	30	6	77	147
Antimicrobial Group	Antimicrobial										
Aminoglycosides	Gentamicin	N	-	3	10	1	1	30	6	77	147
		% R	0	0	0	0	100	0	0	0	0
	Streptomycin	N	-	3	10	1	1	30	6	-	21
		% R	0	0	40	-	100	60	0	-	80
Amphenicols	Chloramphenicol	N	-	3	10	1	1	30	6	77	147
		% R	50	0	30	0	100	46.7	0	32	71
Cephalosporins	3rd generation cephalosporins	N	-	-	-	-	1	30	-	77	147
		% R	0	-	-	-	100	0	-	0	0
	Ceftiofur	N	-	3	10	-	-	-	6	-	-
		% R	-	0	0	-	-	-	0	-	-
	Cephalothin	N	-	-	10	1	-	-	-	-	-
		% R	-	-	0	0	-	-	-	-	-
Fluoroquinolones	Ciprofloxacin	N	-	-	10	1	1	30	-	77	147
		% R	0	-	10	0	0	0	-	0	0
	Enrofloxacin	N	-	3	-	-	1	-	6	-	-
		% R	-	0	-	-	0	-	0	-	-
Penicillins	Ampicillin	N	-	3	10	1	1	30	6	77	147
		% R	100	0	40	0	100	66.7	0	52	71.4
Quinolones	Nalidixic acid	N	-	3	10	1	1	30	6	77	147
		% R	-	0	20	0	100	3.3	0	1	0
Sulfonamides	Sulfonamide	N	-	3	10	1	1	30	6	77	147
		% R	100	0	40	0	100	66.7	0	68	71.4
Tetracyclines	Tetracyclin	N	-	3	10	-	1	30	6	77	147
		% R	100	0	40	-	100	96.7	0	73	93
Trimethoprims	Trimethoprim	N	-	3	10	1	1	30	6	77	21
		% R	-	0	0	0	0	3.3	0	30	19.1
Trimethoprims + Sulfonamides	Trimethoprim + Sulfonamide	N	-	-	-	1	1	-	-	-	147
		% R	-	-	-	0	0	-	-	-	-
Multiresistant isolates	fully sensitives	%	-	100	30	100	0	0	100	37	23.8
	resistant to 1 antimicrobial	%	-	-	-	-	0	33.3	-	13	4.7
	resistant to 2 antimicrobials	%	-	-	-	-	0	0	-	4	0
	resistant to 3 antimicrobials	%	33	-	10	-	0	0	-	12	6
	resistant to 4 antimicrobials	%	-	-	-	-	0	26.7	-	4	19
	resistant to >4 antimicrobials	%	-	-	40	-	100	39.9	-	29	71

Note: Only selected antimicrobials are presented in the table. The percentage of multiresistant isolates is based on all antimicrobials tested. Tables containing results for all antimicrobials tested can be found in Level 3.

Table AB SA9. Antimicrobial resistance in *S.* Typhimurium from *Gallus gallus*, 2004

	Country		A	B	CZ	DK	FIN	F	D	GR	H	PL	SK	S	NL	UK
	Monitoring program		no	no	yes	yes	yes	yes	no	no	no	yes	yes	yes	yes	yes
	No of isolates available		50	43	1	18	2	43	49	10	7	4	4	2	9	11
Antimicrobial Group	Antimicrobial															
Aminoglycosides	Gentamicin	N	50	43	1	18	2	43	49	7	7	4	4	2	9	11
		%R	6	0	0	0	0	0	0	0	0	0	0	0	0	0
	Streptomycin	N	50	43	1	18	2	43	49	7	7	4	4	2	-	11
		%R	12	25.6	0	17	0	55.8	63.3	0	28.6	25	50	0	-	64
Amphenicols	Chloramphenicol	N	50	43	1	18	2	43	49	7	7	4	4	2	9	11
		%R	6	25.6	0	6	0	16.3	53.1	0	28.6	25	25	0	22	45
Cephalosporins	3rd generation cephalosporins	N	-	-	-	-	2	-	-	-	-	-	-	-	9	-
		%R	-	-	-	-	0	-	-	-	-	-	-	-	0	-
	Ceftiofur	N	-	43	-	18	-	-	49	-	7	4	-	2	-	-
		%R	-	0	-	0	-	-	0	-	0	0	-	0	-	-
Fluoroquinolones	Ciprofloxacin	N	50	-	-	18	-	-	49	7	0	4	4	-	9	11
		%R	0	-	-	0	-	-	0	0	-	0	0	-	0	0
	Enrofloxacin	N	-	43	1	-	2	43	-	-	7	-	-	2	-	-
		%R	-	0	0	-	0	2.3	-	-	0	-	-	0	-	-
Penicillins	Ampicillin	N	50	43	1	18	2	43	49	7	7	4	4	2	9	11
		%R	8	41.9	0	17	0	30.2	63.3	0	28.6	50	50	0	44	45
Quinolones	Nalidixic acid	N	50	43	-	18	2	43	49	7	7	4	4	2	9	11
		%R	0	7	-	0	0	16.3	2	0	0	50	0	0	0	9
Sulfonamides	Sulfonamide	N	50	43	-	18	2	43	49	7	7	4	4	2	9	11
		%R	14	41.9	-	11	0	32.6	81.6	0	71.4	50	50	0	44	64
Tetracyclines	Tetracyclin	N	50	43	1	18	-	43	49	7	7	4	4	2	9	11
		%R	14	39.5	0	17	-	44.2	59.2	0	28.6	25	25	0	33	55
Trimethoprims	Trimethoprim	N	50	-	-	18	2	-	49	4	-	4	4	2	9	-
		%R	2	-	-	0	0	-	2	0	-	0	25	0	22	-
Trimethoprims + Sulfonamides	Trimethoprim + Sulfaonamide	N	-	43	1	-	-	43	49	7	7	-	4	-	-	11
		%R	-	25.6	0	-	-	7	0	0	0	-	25	-	-	0
			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Multiresistant isolates	fully sensitives	%	86	53.5	100	-	100	0	14.3	0	28.6	50	50	0	40	27
	resistant to 1 antimicrobial	%	-	-	-	-	0	21	18.4	-	42.9	-	-	-	10	0
	resistant to 2 antimicrobials	%	-	-	-	-	0	14	8.2	-	-	-	-	-	0	18
	resistant to 3 antimicrobials	%	-	-	-	-	0	0	0	0	-	-	-	-	20	0
	resistant to 4 antimicrobials	%	2	-	-	-	0	2.3	6.1	-	-	25	25	-	0	0
	resistant to >4 antimicrobials	%	12	-	-	-	0	27.9	53.1	-	28.6	25	25	-	30	45

Note: Only selected antimicrobials are presented in the table. The percentage of multiresistant isolates is based on all antimicrobials tested. Tables containing results for all antimicrobials tested can be found in Level 3.

Table AB SA10. Antimicrobial resistance in *S.* Enteritidis from *Gallus gallus*, 2004

	Country		A	B	CZ	EST	F	D	GR	H	I
	Monitoring program		no	no	yes	yes	yes	no	no	no	no
	No of isolates available		338	144	21	3	73	54	38	63	1441
Antimicrobial Group	Antimicrobial										
Aminoglycosides	Gentamicin	N	338	144	-	2	73	54	26	63	101
		%R	0.9	0	-	0	4.1	0	0	0	0
	Streptomycin	N	338	144	-	2	73	54	25	63	101
		%R	0.9	0	-	0	5.3	1.9	0	1.6	14.9
Amphenicols	Chloramphenicol	N	338	144	21	2	73	54	26	63	101
		%R	0	0	0	0	0	0	0	0	0
Cephalosporins	3rd generation cephalosporins	N	-	-	-	-	-	-	-	-	-
		%R	-	-	-	-	-	-	-	-	-
	Cefotaxim	N	338	-	-	2	73	-	18	-	101
		%R	0	-	-	0	0	-	0	-	0
Fluoroquinolones	Ciprofloxacin	N	338	-	-	2	-	54	26	0	101
		%R	0	-	-	0	-	0	0	-	0
	Enrofloxacin	N	-	144	-	2	73	-	-	63	101
		%R	-	0	-	0	0	-	-	0	1
Penicillins	Ampicillin	N	338	144	21	2	73	54	26	63	101
		%R	0	2.1	0	0	8.2	1.9	0	6.3	5
Quinolones	Nalidixic acid	N	338	144	-	2	73	54	26	63	101
		%R	2.4	2.1	-	50	17.8	31.5	23.1	9.5	20.8
Sulfonamides	Sulfonamide	N	338	144	-	2	73	54	26	63	101
		%R	0.9	0	-	0	12.3	0	0	18.9	29.7
Tetracyclines	Tetracyclin	N	338	144	21	2	73	54	26	63	101
		%R	0.9	0	4.8	0	26	0	0	1.6	5
Trimethoprim	Trimethoprim	N	338	-	-	2	-	54	12	0	99
		%R	0	-	-	0	-	0	0	-	8.1
Trimethoprim + Sulfonamides	Trimethoprim + Sulfamethoxazol	N	-	144	-	2	73	54	26	63	-
		%R	-	0	-	0	8.2	0	0	0	-
Multiresistant isolates	fully sensitives	%	92.9	95.8	-	50	23.3	66.7	76.9	68.3	49.5
	resistant to 1 antimicrobial	%	6.2	-	-	0	31.5	31.5	23.1	28.6	-
	resistant to 2 antimicrobials	%	-	-	-	50	1.4	1.8	-	3.2	29.7
	resistant to 3 antimicrobials	%	-	-	-	0	0	0	-	-	1.1
	resistant to 4 antimicrobials	%	0.9	-	-	0	6.9	0	-	-	1.1
	resistant to >4 antimicrobials	%	-	-	-	0	4.1	0	-	-	0

Table AB SA10. Antimicrobial resistance in *S.* Enteritidis from *Gallus gallus*, 2004 (cntd.)

	Country		LV	LT	PL	P	SK	SLO	ES	NL[1]	UK
	Monitoring program		yes	yes	yes		yes	no	no	yes	yes
	No of isolates available		4	17	106	5	78	27	26	271	13
Antimicrobial Group	Antimicrobial										
Aminoglycosides	Gentamicin	N	4	1	105	4	48	27	26	27	13
		%R	0	100	1	0	0	0	15.4	0	0
	Streptomycin	N	2	1	105	4	48	27	26	-	13
		%R	0	0	4.8	0	0	0	0	-	8
Amphenicols	Chloramphenicol	N	3	1	105	5	48	27	26	27	13
		%R	0	0	1	0	0	0	0	0	8
Cephalosporins	3rd generation cephalosporins	N	-	-	-	-	-	27	26	27	-
		%R	-	-	-	-	-	0	0	0	-
	Cefotaxim	N	4	-	-	5	48	-	-	-	13
		%R	0	-	-	0	0	-	-	-	0
Fluoroquinolones	Ciprofloxacin	N	1	1	105	5	48	27	26	27	13
		%R	0	0	0	0	0	0	0	0	0
	Enrofloxacin	N	-	-	-	-	-	27	-	-	-
		%R	-	-	-	-	-	7.4	-	-	-
Penicillins	Ampicillin	N	3	1	105	-	48	27	26	27	13
		%R	0	0	1	-	0	7.4	15.4	11	0
Quinolones	Nalidixic acid	N	1	1	105	5	48	27	26	27	13
		%R	0	0	22.9	80	2	63.0	96.2	0	0
Sulfonamides	Sulfonamide	N	-	-	105	-	48	27	26	27	13
		%R	-	-	2.9	-	0	0	3.8	3.7	8
Tetracyclines	Tetracyclin	N	3	1	105	4	48	27	26	-	13
		%R	33	0	1	0	0	0	3.8	-	8
Trimethoprim	Trimethoprim	N	2	1	105	-	48	27	26	-	-
		%R	0	0	1	-	0	0	0	-	-
Trimethoprim + Sulfonamides	Trimethoprim + Sulfamethoxazol	N	2	1	-	3	48	27	-	-	13
		%R	0	0	-	0	0	0	-	-	0
Multiresistant isolates	fully sensitives	%	75	-	68.6	-	98	37.0	3.8	85	85
	resistant to 1 antimicrobial	%	25	100	22.7	-	2	48.2	76.9	15	8
	resistant to 2 antimicrobials	%	-	-	3.8	-	-	7.4	15.4	0	0
	resistant to 3 antimicrobials	%	-	-	1.9	-	-	7.4	3.8	0	8
	resistant to 4 antimicrobials	%	-	-	1.9	-	-	0	0	0	0
	resistant to >4 antimicrobials	%	-	-	1.0	-	-	0	0	0	0

Note: Only selected antimicrobials are presented in the table. The percentage of multiresistant isolates is based on all antimicrobials tested. Tables containing results for all antimicrobials tested can be found in Level 3.
1. In The Netherlands isolates from poultry.

3.1.7. Summary on Salmonella

Humans

The incidence of salmonellosis in EU-25 in 2004 was 42.2 per 100,000 population. This represents an increase of 22% when compared with 2003. This is due mainly to the addition of the ten new MS reporting for the first time. In the old MS, a general decreasing trend of salmonellosis has been observed in recent years. This decrease is most likely due to *Salmonella* control programmes in these countries. A quarter of all reported cases in EU-25 are from children aged 0-4 years, and there is a seasonal peak during the late summer/autumn. *Salmonella* Enteritidis comprised 76% of all the reported cases in 2004.

Food

Data on *Salmonella* were reported for a wide range of foodstuffs. The majority of samples were collected from various types of meat and meat products and the number of samples collected and the types of food selected differed between MS.

The lowest levels of contamination in eggs, poultry, pig, and bovine meat during the last five-year period has been reported from Finland, Sweden and Norway. *Salmonella* was detected at all levels of the poultry meat production, with the highest rates of contamination observed at the slaughterhouse and processing plants. Proportions of positive samples in poultry meat were generally lower than 10%, with the lowest proportions reported in countries with control programmes in the poultry production.

In table eggs, a general decrease was observed in those countries that have reported consistently since 2000. Contamination rates reported did not exceed 2,4% in 2004.

In pig meat, no clear trend was discernable in the MS that have provided data for five years, except for The Netherlands where a clear reduction was observed. *Salmonella* levels in fresh pig meat ranged from 0 to 32.8%, however, most countries reported levels below 10%.

Levels of *Salmonella* contamination in bovine meat were generally lower than 2%. The same rates of contamination were reported at all levels of the production. Some MS reported the same levels of contamination in fresh meat and ready-to-eat-meat products. *Salmonella* contamination in ready-to eat meat products constitutes a particular risk to human health.

With a few exceptions, New MS generally reported similar levels of Salmonella in food as the old MS.

Animals

The mandatory control program for *Salmonella* in breeding flocks of *Gallus gallus* ensures relatively comparable data within the Community. Overall, 6.3% of the layer breeding flocks and 3.3% of the broiler breeding flocks were infected with *Salmonella* in the EU-25 MS in 2004. The levels of *Salmonella* infection in flocks of layer breeders ranged from 0 to 33%, and in flocks of broiler breeders from 0 to 37% in the MS with *Salmonella* control programmes.

In flocks of laying hens the levels of infection in the different MS ranged from 0 to 32.2% and in flocks of broilers the ranges were from 0 to 23.4%.

The proportion of infected flocks ranged between 4.8 – 57% in ducks, 6.8 – 14.6% in geese and 0-35.8% in turkeys within the MS reporting data from at least 25 production flocks.

Few MS have active monitoring of *Salmonella* in pigs and cattle. As in previous years, the level of *Salmonella* in pig and cattle herds in Finland, Norway and Sweden remained low In Italy the proportion of infected cattle herds was slightly higher (1.5%), and in the Netherlands, a relatively high proportion of the pig fattening herds were infected (29.4%).

Feedingstuffs

The occurrence of *Salmonella* in fishmeal decreased in most MS in 2004 compared to previous years, whereas the overall levels of *Salmonella* in meat and bone meal and in compound feedingstuffs were comparable to previous years. The level of *Salmonella* contamination in feed of vegetable origin varied considerably between MS in 2004. This was especially true for oil seeds and products thereof (0-7.5% positive units). No general trend was discernable. *S.* Enteritidis and *S.* Typhimurium were detected in several types of feedingstuffs, however the levels were low.

Salmonella serovars

Overall, 86% of the isolates from human cases in the Community were serotyped. *S.* Enteritidis and *S.* Typhimurium were the most commonly reported serovars from human infections, comprising 76% and 14% of human cases respectively. Other serovars caused 1% or less of the total number of cases in the EU-25. Inclusion of the new MS increased the relative proportion of *S.* Enteritidis.

S. Enteritidis was the most commonly occurring serovar isolated from the monitoring of broiler meat in 2004, followed by *S.* Infantis and *S.* Typhimurium. However, the predominance of specific serovars in broiler meat varied greatly between the MS.

Generally, table eggs are not monitored. The data available from two MS showed that *S.* Enteritidis was the predominating serovar in table-eggs. The dominant serovars isolated from laying hens and broilers (*Gallus gallus*) were *S.* Enteritidis (ranging from 2 to 93%), *S.* Infantis (0-54%) and *S.* Typhimurium (2-20%).

S. Typhimurium was the predominating serovar isolated from pigs and pig meat followed by *S.* Derby. The serotype distribution in pig meat in 2004 was largely comparable to the distribution in 2003, with the exception of an increasing occurrence of *S.* Infantis.

Several MS provided serovar information for bovine meat in 2004, but the monitoring data was too sparse for a Community evaluation of the serovar distribution. In cattle, *S.* Typhimurium and *S.* Dublin were the most frequently detected serovars during monitoring in 2004.

Antimicrobial resistance

Twenty-four MS and Norway provided data on antimicrobial resistance in *Salmonella* isolates from humans, various animal species and food of animal origin. Resistance to ampicillin, streptomycin, tetracycline and sulphonamide was common in *Salmonella* isolates from humans. Most MS reported resistance to nalidixic acid, which is an indicator of emerging resistance to fluoroquinolones. Among isolates from food (bovine-, pig-, and poultry-meat) resistance to ampicillin, nalidixic acid streptomycin, tetracycline was common. Resistance to nalidixic acid occurred especially in broiler and poultry meat, whereas resistance to fluoroquinolones was uncommon. Several MS reported high levels of resistance to ampicillin, streptomycin, tetracycline and sulphonamide in *Salmonella* from animals (cattle, pigs an poultry). With some exceptions resistance to nalidixic acid, as well as fluoroquinolones was low. Large variations in the resistance levels between MS were evident. The levels of antimicrobial resistance in *Salmonella* reported by new MS were similar to or lower than levels reported by the old MS. However, in many cases, reporting was based on a relatively small number of isolates, making direct comparison of prevalence between MS less valid.

The reporting of antimicrobial resistance in *Salmonella* from the MS clearly demonstrates the presence of a reservoir of antimicrobial resistance in food animals and food of animal origin that likely reflects antimicrobial consumption in food animals in the MS. Emergence of infections in humans, caused by resistant bacteria originating from the animal reservoir is a concern, as effective treatment may be compromised.

3.1.8. Sources of Salmonella data

Humans

Salmonellosis is a notifiable disease in humans in all MS, with the exception of The Netherlands and the United Kingdom (Appendix Table SA23). In the United Kingdom, reporting of food poisoning is mandatory, however, isolation and specification of the organism is voluntary. Luxembourg did not provide any data in 2004.

Food

Data on *Salmonella* in foodstuffs were reported by most MS and Norway in 2004. However, the sampling schemes, place of sampling, sampling frequency, and diagnostic methods applied varied between MS and in the different types of food sampled. For a full description of the monitoring schemes implemented in the individual MS and the diagnostic methods used, please refer to Appendix Tables SA9, SA12, SA18 and SA21. The monitoring schemes are based on a variety of different samples such as neck skin samples, carcass swabs, caecal contents and meat cuttings, collected at slaughter, processing, meat cutting plants and at retail. A few MS reported data collected as part of HACCP programmes, based on sampling at critical control points. These samples are targeted samples, specifically sampled at certain point of the production and may not be compared directly with samples collected randomly for monitoring purposes and have therefore not been included in the tables.

Information on serotype distribution was not provided consistently from all MS, but has been included in the tables presented for 2004 data, wherever available. All data reported by the MS have been summarised in Level 3, Table SA8 and SA9.

Animals

Salmonella in poultry (*Gallus gallus*) and other animals is notifiable in most MS (Appendix, Table SA23), except for Hungary. No information was received from the Czech Republic, France, Ireland, Luxembourg, Malta and Poland. In Denmark clinical cases are notifiable.

Monitoring of *Salmonella* in animals is mainly conducted as passive laboratory based surveillance of clinical samples, active routine monitoring of flocks of breeding and production animals in different age groups, and testing during meat inspection (organs).

Directive 92/117/EEC prescribed a sample plan for the control of *S.* Enteritidis and *S.* Typhimurium in breeding flocks of *Gallus gallus*. This should ensure comparability of data from MS, however, in Belgium and Estonia, the monitoring scheme applied differs from that described in Directive 92/117/EEC. In Appendix, Table SA2-4 the monitoring programmes and control strategies applied in the different MS are shown.

The directive does not include requirements of monitoring and control of other commercial poultry production systems, but most MS have national programmes for laying hens (Appendix, Table SA5 and SA6), broilers (Appendix, Table SA7 and SA8), ducks (Appendix, Table SA13 and SA15), geese (Appendix, Table SA14 and SA15) and turkeys (Appendix, Table SA10 and SA11). Some MS also monitor *Salmonella* in pigs (Appendix, Table SA16 and SA17), cattle (Appendix, Table SA19 and SA20) and other animals.

All data reported by the MS have been summarised in Level 3, Table SA10-SA13.

Feedingstuffs

There is no common sampling scheme for feed materials in the EU. Results from compulsory and voluntary monitoring programmes, follow-up investigations, industry quality assurance programmes, as well as surveys, are reported (Appendix, Table SA1). The MS monitoring programmes often include both random sampling, as well as targeted sampling, of feedstuffs that are considered risk products. Samples of raw material, materials during processing and final products are collected from batches of feedstuffs of domestic and imported origin. The reported epidemiological units are either “batch” (usually based on pooled samples) or “sample” (often several samples from the same batch). In 2004, most MS did separate data from the different types of monitoring programmes or data from domestic and imported feed. Therefore, it must be emphasised that the data related to *Salmonella* in feedstuffs cannot be considered national prevalence data, and due to the lack of a harmonised surveillance approach data are not comparable between the countries. Nevertheless, data are presented in the same tables.

Information was requested on feed materials of animal and vegetable origin and of compound feedstuffs (mixture of feed materials intended for feeding of specific animal groups). Detection of *Salmonella* in fishmeal, meat and bone meal, cereals, oil seeds and products and compound feed for cattle, pigs and poultry in 1999 to 2004 are presented. Sample and batch based data from the different monitoring systems were summarised. Data were excluded when either the number of tested units or number of positive units were missing or if directly labelled as imported. The tables only include MS reporting results for at least 25 samples or batches in 2003 or 2004. All feedstuff data from the new Member Stats are summarised in a table.

All data reported by the MS have been summarised in Level 3, Table SA14-SA16.

An overview of countries providing data on serovars and phage types are presented in Appendix, Table SA22. For a summary of the serovar data reported by each MS and Norway see Level 3, Table SA17-SA41 and for a summary of the *S.* Enteritidis and *S.* Typhimurium phage type data reported by the MS see Level 3, Table SA42 and SA43.

Antimicrobial resistance

Data on the occurrence of antimicrobial resistance in *Salmonella* were provided by 24 MS and Norway. Malta did not provide data. The countries reported results of antimicrobial susceptibility testing of *Salmonella* isolates from humans, various animal species and from various foods and feedstuffs. Results were requested for the Community Report as percentage of resistant isolates out of the total number of isolates tested against each antimicrobial for each bacterial species, in each specific sample category. In contrast to previous years countries were not confined to reporting on a defined panel of antimicrobials, specific serovars or specific sample categories. This has caused large heterogeneity of data on antimicrobial resistance in *Salmonella* reported for 2004. In order to preserve comparability of data between countries, categories in which several countries reported were primarily selected for this summary. Furthermore, categories were selected based on their relative public health importance. Direct comparison of proportions of resistant isolates between countries was avoided if the reporting was based on small numbers of isolates.

MS' generate data on antimicrobial susceptibility in *Salmonella* in different ways. Most often the reported isolates constitute a subsample of isolates available at the National Reference Laboratory. Isolates may be obtained by different laboratory based monitoring approaches; either by active and systematic monitoring of healthy animals, foods, a.o. sources, or by passive monitoring based on diagnostic submissions of samples from cases of clinical salmonellosis in animals and by testing of foods only on suspicion. In some MS, *Salmonella* prevalence in animals and food is very low and only a limited number of isolates, or none, were available for susceptibility testing.

In most MS standard methods and breakpoints published by the National Committee for Clinical Laboratory Standards, USA (NCCLS)[1,2], are used for susceptibility testing of *Salmonella* isolates, but for some substances national standards are used. For a few antimicrobials, no NCCLS standard breakpoints are established. Most reporting MS provided data on *Salmonella* serovars *S.* Enteritidis or *S.* Typhimurium. In order to facilitate comparison of data, this summary is based only on reporting of antimicrobial resistance in these two serovars. When comparing results of antimicrobial susceptibility testing of *Salmonella* isolates, special attention should be given to variation in break points used by different countries. This applies especially to streptomycin and ciprofloxacin. Please refer to Level 3, Table AB SA15 for information on breakpoints and ranges used by different countries.

1 Performance Standards for Antimicrobial Disk and Dilution Susceptibility Tests for Bacteria Isolated from Animals; Approved Standard [ISBN 1-56238-377-9] M31-A.

2 NCCLS. Performance Standards for Antimicrobial Susceptibility Testing: Eleventh Informational Supplement. NCCLS document M100-S11 [ISBN 1-56238-426-0]. NCCLS, 940 West Valley Road, Suite 1400, Wayne, Pennsylvania 19087-1898 USA, 2001. (NCCLS changed name to Clinical and Laboratory Standards Institute by January 1st, 2005 (www.clsi.org).

3.2. Campylobacter

Campylobacteriosis in humans is caused by thermophilic *Campylobacter* spp. Most of the cases are due to thermophilic species *C. jejuni* and *C, coli*, but also *C. lari*, *C, fetus* and *C, upsaliensis* are known to cause infections in humans. In developed countries, *C. jejuni* is most commonly isolated from human infections.

Patients may have mild to severe symptoms. The infective dose is low, and infection is generally manifested by an acute attack of diarrhoea, abdominal pain and cramps. Infections are usually self-limiting and last only a few days. Extra-intestinal infections and chronic sequelae do occur and *C. jejuni* has recently become the most recognised antecedent cause of Guillain-Barré syndrome (GBS), which is an acute temporal paralysis of the peripheral nervous system.

Thermophilic *Campylobacter* spp. are widespread in nature and the principal reservoirs are the alimentary tracts of wild and domesticated birds and mammals. Consequently, thermophilic *Campylobacter* spp., especially *C. jejuni* and *C. coli*, are commonly isolated from water sources, farm animals such as poultry, cattle, pigs and sheep, as well as from cats and dogs. Animals rarely succumb to disease by these organisms. The bacteria can readily contaminate various foodstuffs, including meat, raw milk and dairy products, and, less frequently, fish and fishery products, mussels and fresh vegetables.

Among sporadic cases, contact with live poultry, consumption of poultry meat and contact with pets and other animals has been identified as major sources of infection. Raw milk and contaminated drinking water have also been causes of major outbreaks.

3.2.1. Campylobacteriosis in humans

A total of 183,961 cases of laboratory confirmed campylobacteriosis were recorded in the EU-25 in 2004. The overall incidence of campylobacteriosis was 47.6 per 100,000 population, which is slightly higher than for *Salmonella* (42.2). This makes *Campylobacter* the most commonly reported gastrointestinal bacterial pathogen in humans in the EU (Table CA1).

With the exception of Spain and Sweden, all EU-15 MS reported an increase in the number of human cases of campylobacteriosis in 2004 compared to 2003. The reported incidences of human campylobacteriosis in the new MS ranged from 0.1-89.8 cases per 100,000 population. However, the Czech Republic, where diagnosing of human cases has only recently begun, reported a remarkably high number of cases and the highest incidence within the Community, with 249.6 cases per 100,000 population. The overall incidence in 2004, including all reporting EU MS represents an increase of approximately 32% compared to 2003. If the cases from the Czech Republic are excluded from the EU-total, the overall incidence was 42.1 per 100,000 population corresponding to a 12% increase compared to 2003. A notable increase in number of human cases reported from Austria in 2004 was observed following improvements in the notification system.

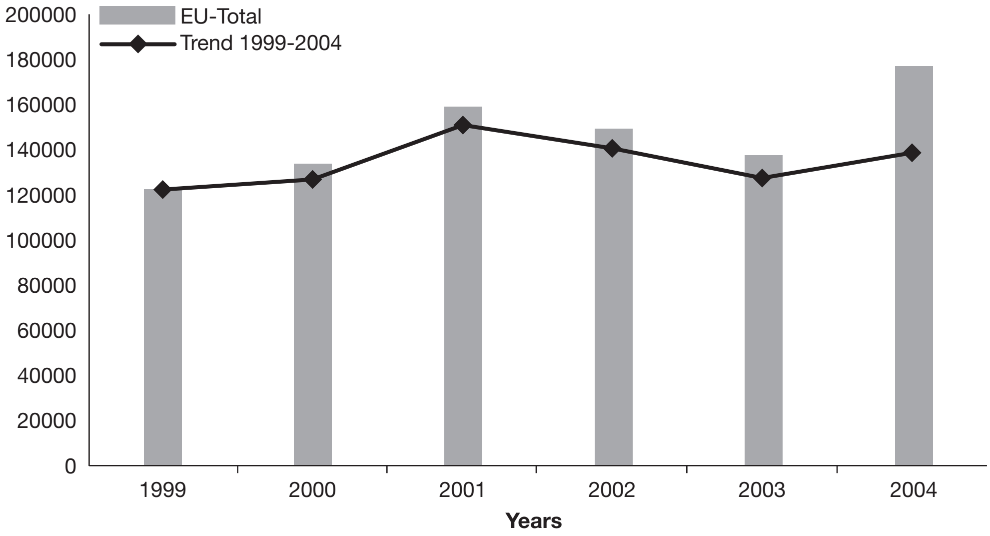
Table CA1. Number of reported human cases of campylobacteriosis from 1999-2004, and incidences in 2004[1]

	2004 Cases/ 100,000 population	2004	2003 Number of cases	2002	2001	2000	1999
Austria	76.4	6,222	3,926	4,446	3,919	3,458	3,253
Belgium	64.6	6,716	6,556	7,354	7,357	6,682	-
Cyprus	0	0	-	-	-	-	-
Czech Republic	249.6	25,492 (253)	-	-	-	-	-
Denmark	69	3,724	3,537	4,385	4,620	4,386	4,164
Estonia	9.2	124 (4)	-	-	-	-	-
Finland	68.6	3,583	3,190	3,738	3,969	3,527	3,305
France	3.6	2,127 (77)	1,997	1,353	203	378	
Germany	67.5	55,745 (4426)	47,876	56,350	54,410	30,876	28,882
Greece	3.6	392	1	-	386	3	15
Hungary	89.8	9,087	-	-	-	-	-
Ireland	42.5	1,711	1,568	1,336	1,286	1,613	2,085
Italy	-	-	1		-	-	-
Latvia	0	0	1	-	-	-	-
Lithuania	23.1	797	617	-	-	-	-
Luxembourg	-	-	-	-	287	-	171
Malta	-	-	-	-	-	-	-
Poland	0.1	24	-	-	-	-	-
Portugal	-	-	-	-	-	-	-
Slovakia	31.4	1,691 (9)	-	-	-	-	-
Slovenia	53.2	1,063	890	-	-	-	-
Spain[2]	14.1	5,958	6,048	5,051	6,149	6,113	5,101
Sweden	68.7	6,169 (3372)	7,149	7,137	7,845	7,646	7,137
The Netherlands	20.1	3,273 (300)	2,805	3,421	3,682	3,474	3,175
United Kingdom	83.9	50,063	49,055	52,519	62,118	63,371	63,174
EU-Total	**47.6**	**183,961**	**135,217**	**147,095**	**156,231**	**131,527**	**120,462**
Norway	49.7	2,275 (1111)	2,270	2,192	2,889	2,326	2,027

Note: Figures in brackets are reported imported cases, values are included in the total number of cases.
1. EU-Total incidence is based on population in reporting countries.
2. In Spain, only hospitalised cases are notifiable.

For those MS that have consistently reported the number of human cases since 1999, a gradual decrease was observed from 2001 to 2003, however, in 2004 the number of cases increased once again (Figure CA1).

Figure CA1. The total number of human cases of campylobacteriosis and the trend for countries reporting consistently from 1999-2004 (9 MS)



Trend data from: Austria, Denmark, Finland, Germany, Ireland, Spain, Sweden, The Netherlands, and United Kingdom.

In 2004, there was a definite predominance of human campylobacteriosis cases amongst the age categories 1-4 years and 25-55 years. Furthermore, there was also a clear seasonal distribution with an increase of cases during the summer months from June to September. These trends are similar to what has been observed in previous years.

All reported data on *Campylobacter* in humans are presented in Level 3, Table CA1-CA7.

3.2.2. Campylobacter in food

Results from several different food categories were reported by the MS. The number of samples collected ranged from a few samples to several thousands. The sampling and testing methods varied between the countries and as such the results are not directly comparable between the countries. Also, it should be taken into consideration, that *Campylobacter* are known to be more prevalent during the summer than during the winter. Thus, the proportion of positive samples observed, may be influenced by the time of year at which the samples are taken.

Poultry meat and products thereof

Data on the occurrence of *Campylobacter* in fresh poultry meat at different stages of production from 2000-2004 are summarised in Table CA2. The data reported from 2000 to 2004, provide no clear increasing or decreasing trend for the occurrence of *Campylobacter* in fresh poultry meat, in the reporting countries. As same procedures of sampling and testing have not always been used consistently, figures are not necessarily directly comparable even within one country.

In Table CA3, findings of *Campylobacter* in fresh poultry meat (broiler, turkey and duck meat) sampled at different stages of the production line are summarised. At slaughter the prevalence ranged from 1.8% to 83%. At the processing level, ranges of 26.0-53.0% were reported, and at the retail level, proportions of positive samples were within the same the magnitude, ranging from 2.2-62.2% positive samples.

Samples of poultry meat products at the retail level were collected in Austria, Belgium, Estonia, Finland, Germany, Ireland, Italy, Lithuania, Spain and Sweden. Only Belgium, Finland, Germany and Spain reported positive findings, ranging from 10.9% in Germany to 60.4% in Belgium, (see Level 3, Table CA8 for further details). A large number of broiler meat products (non-ready to eat and ready–to-eat) were tested in Ireland. In non-ready-to eat products, sampled at processing, 38.7% were found positive. Very few positive samples (0.2%) were found in ready-to-eat products. (see Level 3, Table CA8).

The United Kingdom conducted a survey of *Campylobacter* in fresh wild game bird meat. A total of 33 samples were tested and 14 samples (42.4%) were found positive.

Table CA2. *Campylobacter* in fresh poultry meat sampled[1] at slaughter, processing and retail in MS that reported data from 2000-2004

	2004		2003		2002		2001		2000	
	N	% Pos	N	% Pos	N	% Pos	N	% Pos	N	% Pos
At slaughterhouse or processing plants (sample based data)										
Belgium	197	4.1	142	16.2	138	19.6	147	22.5	171	28.7
Ireland	2,620[2]	54.7	1,868[3]	58.1	3,222	53.0	3,213	54.3	3,422	53.9
At retail										
Austria[5]	525	45.3	231	47.2	74	9.5	172	32.6	200	20.0
Belgium	77	6.5	99	20.2	92	16.3	82	2.4	83	7.2
Denmark	584	23.5	407[3]	32.9	712	41.7	1,896[4]	29.5	708	41.1
Finland	130	20.0	-	-	244	19.7	101	22.8	161	10.6
France	-	-	-	-	406	88.7	-	-	-	-
Germany	2,000	34.5	1,396	19.6	1,510	25.0	1,058	14.5	958	19.5
Ireland	99[2]	77	-	-	-	-	151	12.6	391	38.9
Norway	1,067	5.1	1,093	5.0	1,069	8.1	-	-	-	-
Sweden	27	55.6	425	13.2	-	-	79	11.4	858	9.3
The Netherlands	1,477	29.3	1,510	26.0	1,600	31.3	1,578	32.5	1,454	30.5
United Kingdom	1,533[2]	62.2	734	73.0	-	-	-	-		

Note: Data from 2000-2003 are all broiler samples.
1. Data are only presented for sample size >25 with positive findings.
2. In Ireland and United Kingdom, broilers.
3. In Ireland and Denmark, domestic broiler meat.
4. In Denmark, data includes turkey meat.
5. In Austria, sampling at retail and processing plants.

Table CA3. *Campylobacter* in fresh poultry meat[1] at slaughter, processing and retail in 2004

	Slaughter		Processing		Retail		Point of sampling not specified	
	N	% Pos	N	% Pos	N	% Pos	N	% Pos
Austria[4]	-	-	-	-	525	45.3	412	52.7
Belgium	197	27.9	131	26.0	77	35.1	336	3.3
Cyprus	47	83.0	47	46.8	-	-	-	-
Czech Republic[2]	-	-	-	-	31	41.9	48	27.1
Denmark	-	-	-	-	584	23.5	-	-
Estonia	27	37.0	12	33.3	-	-	-	-
Finland, broiler meat	182	18.7	-	-	104	20.2	-	-
Finland, turkey meat[3]	37	29.7	-	-	26	19.2	-	-
France[2]	142	81.7	-	-	-	-	-	-
Germany	-	-	151	53.0	2,000	34.5	-	-
Ireland, broiler meat	-	-	2,620	54.7	99	77	-	-
Ireland, turkey meat	-	-	384	33.1	-	-	-	-
Ireland, duck meat	-	-	60	21.7	-	-	-	-
Italy, other poultry meat	-	-	-	-	-	-	120	0.0
Latvia[2]	110	1.8	-	-	365	2.2	-	-
Malta	29	24.1	-	-	-	-	-	-
Norway	-	-	-	-	1,067	5.1	-	-
Portugal	-	-	33	0.0	47	8.5	-	-
Slovakia	-	-	-	-	270	8.1	-	-
Slovenia, broiler meat	81	19.8	-	-	95	40.0	30	20.0
Spain	146	39.7	151	28.5	321	16.5	-	-
Sweden	-	-	-	-	27	55.6	-	-
The Netherlands	-	-	-	-	1,477	29.3	-	-
United Kingdom, poultry meat	-	-	-	-	1,533	62.2	-	-
United Kingdom, turkey meat	-	-	-	-	152	34.2	-	-
United Kingdom, duck meat	-	-	-	-	33	30.3	-	-

1. Data are only presented for sample size >25 with positive findings.
2. Batch based sampling.
3. In Finland, flock-based samples, neckskin samples.
4. In Austria, sampling at retail and processing plants.

Pig meat and products thereof

Compared to data on poultry meat, much less data are available for pig meat. Data reported on the occurrence of *Campylobacter* in pig meat from 2002-2004 have been summarised in Table CA4. For those MS reporting positive findings in pig meat in 2004, the proportion of positive samples ranged from 1.1% at the retail level in The Netherlands to 11.9% observed at the slaughter level in France. The proportion of positive samples in samples tested at retail was generally low (5% or lower) when compared to the levels in pigs before slaughter (Table CA5).

Table CA4. *Campylobacter* in fresh pig meat, at retail, sample based data, 2002-2004

	2004		2003		2002	
	N	% Pos	N	% Pos	N	% Pos
Belgium	161	5.0	-	-	-	-
Denmark	-	-	50	0	2413	0.2
Germany	454	2.0	188	2.7	254	1.2
Italy	51	2.0	41	9.8	43	4.7
The Netherlands	287	1.1[1]	227	0	97	2.1
Spain	46	-	132	54.6	84	0

1. In The Netherlands, *C.* coli only.

Campylobacter were not isolated from meat product samples in Austria (N=89) or Ireland (N=454). In Italy, 103 meat product samples, tested at processing were found negative, while two out of 362 samples collected at retail were found positive.

Table CA5. *Campylobacter* in fresh pig meat at slaughter, processing and retail, 2004

	Slaughter		Processing		Retail	
	N	% Pos	N	% Pos	N	% Pos
Belgium	344	4.9	266	1.5	161	5.0
France	226	11.9	-	-	-	-
Germany	-	-	15	0	454	2.0
Ireland	-	-	41	0	-	-
Italy	-	-	83	1.2	51	2.0
Slovakia	-	-	-	-	1,278	0
Spain	60	0	31	0	46	0
The Netherlands	-	-	-	-	287	1.1

Bovine meat and products thereof

In samples of fresh bovine meat and meat products, the proportion of samples found positive for *Campylobacter* was generally very low. From 2002-2004, 1.1% or less of the tested samples of bovine meat from Denmark, Italy and The Netherlands were found positive (Table CA6). In 2004, the prevalence ranged from 0.8% at retail in The Netherlands to 11.9% at slaughter in the Czech Republic (Table CA7).

Table CA6. *Campylobacter* in fresh bovine meat, at retail, sample based data, in the years 2002-2004

	2004		2003		2002	
Country	N	% Pos	N	% Pos	N	% Pos
Denmark	96	0	45	0	3,046	0.1
Italy	196	-	161	0.6	90	1.1
The Netherlands	847	0.8	678	0.2	489	0.2

Table CA7. *Campylobacter* in fresh bovine at slaughter, processing and retail, 2004

	Slaughter		Processing		Retail	
Country	N	% Pos	N	% Pos	N	% Pos
Austria	-	-	-	-	34	2.9
Czech republic	42	11.9	-	-	-	-
Denmark	-	-	-	-	96	0
Ireland	-	-	40	0	-	-
Italy	55	3.6	40	0	196	0
Spain	46	0	21	0	30	0
The Netherlands	-	-	40	0	847	0.8

Samples of bovine meat products, collected at processing and at the retail level in Germany, Italy, Spain and Lithuania were all found negative, see Level 3, Table CA8 for details. Two out of 34 non-ready-to-eat products were found positive in Ireland.

Other foodstuffs

Other types of food, not included in the tables above, were also tested for *Campylobacter*. More than 6,000 samples of dairy products were tested in 2004. Among these were 2,138 samples of soft and semi-soft cheeses made from raw or thermised milk, tested in Belgium, Czech Republic, Finland, Estonia, Slovenia and United Kingdom. Positive findings were reported by Belgium, where two out of 147 samples were positive, and by the United Kingdom where one out of 1,842 cheese samples was positive. In the remaining dairy products, only one positive sample was reported from raw cow milk in Hungary (N=78).

Furthermore, out of 241 tested samples of fishery products, none were found positive. However, Belgium found 15 (16.7%) out of 90 tested live bivalve molluscs samples positive for *Campylobacter*. Sweden tested 209 fruit and vegetable samples finding two samples positive. Please refer to Table CA1 in Level 3 of the report for further details.

3.2.3. Campylobacter in animals

While poultry may be a major reservoir for *Campylobacter*, other animal species also constitute reservoirs for the organism. However, the majority of investigations have been carried out within the poultry production.

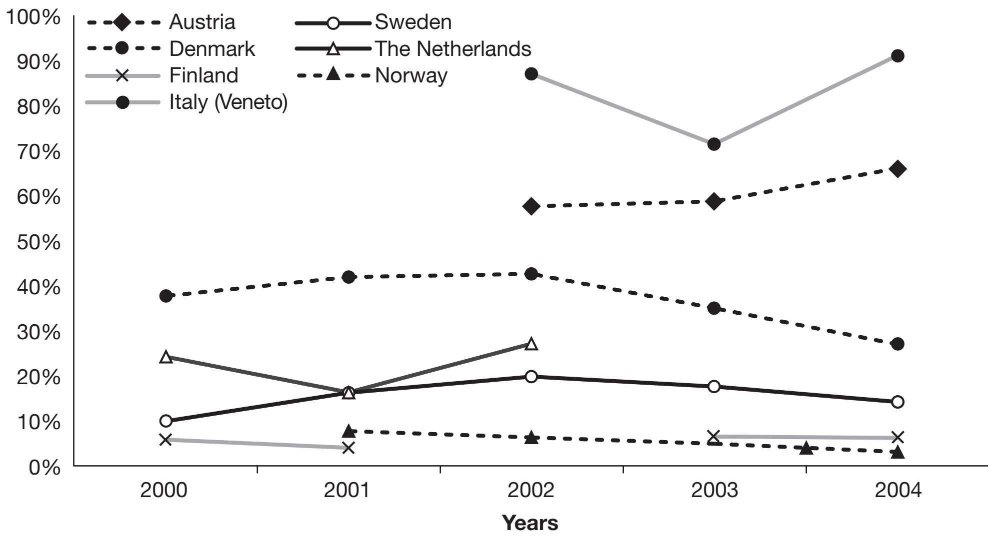
Data on prevalence in broiler flocks has been reported over several years by 6 MS, (in Italy the Veneto region) and Norway. Sweden, Finland and Norway have consistently reported low flock prevalences. Denmark observed somewhat higher flock prevalences, but with a clear decreasing trend. In the Veneto region of Italy the prevalence varied around 70-90%, and in Austria around 60% (Table CA8 and Figure CA2).

Table CA8. *Campylobacter* in broiler flocks, 2000-2004

	2004		2003		2002		2001		2000	
	N	% Pos	N	% Pos	N	% Pos	N	% Pos	N	% Pos
Broilers (flock based data if nothing else stated)										
Austria[1]	-	-			427	52.0	-	-	-	-
Austria[2]	648	64.5	549	58.7	210	57.6	-	-	-	-
Denmark[1]	520	19.4	349	32.4	294	38.8	-	-	-	-
Denmark[2]	5,159	27.0	5,150	35.0	6,255	42.6	6,054	41.9	6,160	37.7
Finland[2]	1,315	6.2	77	6.5	-	-	1,069	4.0	1,094	5.8
Germany[2, 3]			-	-	180	63.9	-	-	-	-
Italy[2] (Veneto region)	212	91.0	154	71.4	23	87.0	-	-	-	-
Norway	3,842[2,4]	3.1	3,550	4.9	3,627	6.3	2,270	7.7		
Sweden	3,019[2]	14.2	3,224[1]	17.6	3,842	19.8	4,220	16.2	3,969	9.9
The Netherlands	6,208	10.0	-	-	166	27.1	123	16.3	128	24.2

1. In Austria and Denmark, at farm.
2. At slaughterhouse.
3. In Germany, survey from Berlin.
4. In Norway, batch based data.

Figure CA2. *Campylobacter* in broiler flocks 2000-2004 in selected countries



Germany and Italy (Region of Veneto) reported positive findings of *Campylobacter* in 22.4% and 93.5% of turkeys, respectively. Italy also investigated wild birds, finding positive proportions ranging from 0.5% (N=202) to 14.4% (N=381).

In contrast to the low proportions of positive samples found in bovine and pig meat, the levels of *Campylobacter* in pig and cattle herds were generally high. Table CA9 and CA10 summarise herd-level data reported from 2000-2004. The reported prevalence in pig herds ranged from 24.8% to 79.6% in 2004 Similar levels were reported in cattle herds, with positive findings ranging from 14.0% to 64.2% in 2004.

Table CA9. *Campylobacter* in pigs and pig herds, 2000-2004

	2004		2003		2002		2001		2000	
	N	% Pos	N	% Pos	N	% Pos	N	% Pos	N	% Pos
Pigs (herd based data)										
Austria[1]	741	57.5	262	53.8	276	54.4	-	-	-	-
Denmark	191	79.6	259	93.4	240	80.4	238	76.9	310	64.2
France[1]	176	70.5	-	-	-	-	-	-	-	-
Germany	375	24.8	-	-	-	-	-	-	-	-
Italy	37	67.6	46	52.2	29	44.8	-	-	-	-
Ireland[1]	273	0.4	-	-	-	-	-	-	-	-
United Kingdom	-	-	528	69.3	-	-	-	-	860	94.5

1. Animal based sampling.

Table CA10. *Campylobacter* in cattle and cattle herds, 2000-2004

	2004		2003		2002		2001		2000	
	N	% Pos	N	% Pos	N	% Pos	N	% Pos	N	% Pos
Cattle (herd based data)										
Austria[3]	898	18.6	346	35.0	350	40.0	-	-	-	-
Denmark[1]	67	64.2	88	63.6	87	65.5	76	72.4	90	61.0
Germany	394	14.0	-	-	-	-	-	-	-	-
Germany[2]	127	1.6	-	-	-	-	-	-	-	-
Italy	150	28.0	119	35.3	229	35.4	-	-	-	-
Italy[3]	1,444	0.7	-	-	-	-	-	-	-	-
Ireland[3]	4,375	0.8	-	-	-	-	-	-	-	-
Lithuania[2,3]	1,424	0.1	-	-	-	-	-	-	-	-
Norway[4]	-	-	-	-	-	-	1222	18.0	-	-
United Kingdom	-	-	667	54.6	-	-	-	-	-	-

1. In Denmark, caecal samples taken at slaughterhouse.
2. In Germany and Lithuania, dairy cows.
3. Animal based data.
4. Survey in calves.

A substantial number of sheep were investigated in Italy at both the herd and animal level. At the animal level, less than 0.3% of the 842 tested samples were positive. However, at the herd level, 22.0% were found positive (N=182). Findings in animal-based samples from sheep in Ireland were consistent with the Italian data, yielding 0.3% positive animals (N=717).

Italy also investigated 190 water buffalos and found only one animal positive for *Campylobacter* spp.

In 2004, a large number of pets was also tested for *Campylobacter*. The proportion of positive samples observed in dogs in Germany, Ireland, Italy, Slovakia and The Netherlands ranged from 0% in Slovakia to 36.8% in The Netherlands. The observed prevalence in cats within these MS was much lower and ranged from 1.7% in The Netherlands to 5.1% in Italy, see Table CA11.

Table CA11. *Campylobacter* in pets[1], 2004

	Pets	N	% Pos
The Netherlands	Birds	32	0
Germany	Cats	246	2.4
Italy	Cats	79	5.1
The Netherlands	Cats	239	1.7
Germany	Dogs	917	2.7
Ireland	Dogs	331	0.9
Italy	Dogs	242	5.4
Slovakia	Dogs	39	0
The Netherlands	Dogs	133	36.8

1. Data are only presented for sample size >25 with positive findings.

Monitoring and control of Campylobacter in broilers

Monitoring programmes for *Campylobacter* in broilers have been implemented in Austria, Denmark, Finland, Italy (Veneto region), Norway, The Netherlands and Sweden. The majority of samples for these programmes are collected at slaughter and investigated bacteriologically. Samples collected in this context are taken either at the slaughterhouse or at the farm, or in both locations.

While the programmes in Denmark and Sweden are voluntary, the programmes in Finland and Norway are mandatory. In Denmark, the programme is financed by the poultry industry and in Sweden the programme is financed by the poultry industry, the Swedish Board of Agriculture and the European Commission. In Norway, an official action plan against *Campylobacter* spp. was established in 2001 and Finland implemented their control programme in 2004.

The programmes share common traits and generally focus on

- High level of biosecurity at the farm level to prevent flocks from being infected.
- Logistic slaughter i.e. slaughtering positive flocks at the end of the day to prevent cross contamination at the slaughterhouse.

Furthermore, carcasses from positive flocks may be frozen or subjected to heat treatment.

Denmark, Norway and Sweden have all experienced a decrease in the number of *Campylobacter* positive broiler flocks over the past three years. This may, in part, be explained by the implemented control strategies.

3.2.4. Campylobacter spp. distribution

A total of 12 MS and Norway provided information on the *Campylobacter* species distribution among human cases in 2004 (Table CA12). Not all human cases were speciated, but for those MS, where the majority of human isolates were speciated, *C. jejuni* was by far the predominant species isolated.

Table CA12. *Campylobacter* species distribution among human cases, 2004

	Cases	Speciated	*C. jejuni*	*C. coli*	*C. lari*	*C. upsaliensis*	*C. fetus*
	N	N	%	%	%	%	%
Austria	6,222	2,005	93.6	6.4	0	0	0
Czech Republic	25,492	25,492	99.5	0.5	0	0	0
Estonia	124	124	98.4	1.6	0	0	0
France	2,127	2,127	81.6	18.4	0	0	0
Germany	55,745	48,083	90.8	9.2	0	0.1	0
Greece	392	392	100	0	0	0	0
Hungary	9,087	9,087	83.9	12.0	4.1	0	0
Ireland	1,711	708	92.5	7.5	0	0	0
Lithuania	797	797	92.0	8.0	0	0	0
Norway	2,275	2,275	94.8	4.8	0	0.4	0
Slovenia	1,063	1,037	100	0	0	0	0
Spain	5,958	5,958	97.3	2.7	0	0	0
The Netherlands	3,273	3,273	94.4	4.5	0.6	0.3	0.2

No cases reported in Cyprus, Italy, Latvia, Luxembourg and Malta in 2004.

As regards isolates from animals and food, the majority of speciated isolates were obtained from poultry and food of poultry origin. In poultry flocks, *C. jejuni* was most commonly isolated at rates ranging from 60.3-95.0% of the positive samples. France and Italy reported almost equal distributions of *C. jejuni* and *C. coli* among isolates obtained from broiler flocks. In poultry products, *C. jejuni* was also the predominant species isolated, however high proportions of *C. coli* were observed in the Czech Republic and Malta. The predominant species found in positive samples from cattle was *C. jejuni*; found in 50.0-100% of the obtained positive samples in Austria, Denmark, Germany, Ireland and Italy. In contrast, *C. coli* was the predominant species found in pig herds. In Austria, Denmark, Germany France and Italy 56.0-98.0% of the positive samples obtained from pig herds were identified as *C. jejuni*. The fact that *C. jejuni* is the predominant species in both humans and poultry, supports the general belief that poultry is one of the major sources of human campylobacteriosis. However, *C. jejuni* is prevalent in other animal species and cattle and pigs, and products thereof are also potential sources of human infections.

3.2.4. Antimicrobial resistance in Campylobacter

Humans

Data on antimicrobial resistance to *Campylobacter* in humans were provided by the following countries: Belgium, Denmark, France, Hungary, Lithuania, Norway and The Netherlands. (Table AB CA1). Isolates reported from Denmark, The Netherlands and Norway were *C. jejuni* only, whereas all other countries reported on more species collectively. Comparison of prevalence of resistance between countries should be made with caution, as the proportion of different *Campylobacter* species may affect the prevalence of resistance. With the exception of Hungary, the countries only reported results for few antimicrobials (3-5). In general, high levels of resistance were reported for tetracyclines and quinolones, whereas resistance to macrolides was generally at a low level. For Lithuania the occurrence of resistance to erythromycin and tetracycline was very low.

For further results on antimicrobial resistance to *Campylobacter* in animals, please refer to Level 3, Table AB CA1.

Food

Data on antimicrobial resistance in *Campylobacter* from broiler meat were provided by the following countries: Belgium, Denmark, Norway, The Netherlands and United Kingdom (Table AB CA2). Belgium further provided data on antimicrobial resistance in pig meat (Level 3, Table AB CA4) and United Kingdom provided further data on antimicrobial resistance in other poultry meat (Level 3, Table AB CA3). Isolates reported from Denmark and Norway were *C. jejuni* only, whereas all other countries reported on more species collectively.

For isolates from broiler meat (Table AB CA2) the highest level of resistance was reported for quinolones, fluoroquinolones and tetracyclines, whereas the level of resistance to macrolides and aminoglycosides was generally low.

However, a considerable variation between countries in prevalence of resistance was evident for quinolones (0-50%), fluoroquinolones (0-56%) and tetracyclines (0-51%), as well as for the proportion of fully sensitive isolates. Denmark and Norway reported a markedly lower prevalence of resistance to these antimicrobials compared to the other countries, and the proportion of fully sensitive isolates was >90% for Norway. Care should be taken when comparing countries reporting resistance for more *Campylobacter* species collectively, with countries reporting for one species only.

For resistance in *Campylobacter* from other poultry meat (Level 3, Table AB CA3), a high level of resistance to several antimicrobials was reported by United Kingdom; especially resistance to ampicillin (67%) and tetracycline (57%) was high. For resistance in *Campylobacter* from pig meat (Level 3, Table AB CA4) provided only by Belgium, a high level of resistance to tetracycline (86%) was reported.

Animals

Data on the occurrence of antimicrobial resistance in *Campylobacter* from animals (cattle, pigs, poultry and sheep) were provided by the following countries; Austria, Denmark, Finland, France, Hungary, Italy, Norway, Spain, Sweden, The Netherlands and United Kingdom (Table AB CA3 to AB Cas, as well as Level 3, Table AB CA12).

For further results on antimicrobial resistance in animals, please refer to Level 3, Table AB CA2, AB CA5 to AB CA11.

In general, a large variation in the prevalence of resistance in *Campylobacter* isolates from animals was observed among the reporting countries. Similar to what was observed for food, this variation was especially large for quinolones, fluoroquinolones and tetracyclines, whereas the prevalence of resistance to macrolides and aminoglycosides in isolates from animals was lower and showed less variation. For *Campylobacter* spp. in general, the prevalence of resistance to some antimicrobials (e.g. fluoroquinolones, quinolones and tetracycline) in isolates reported from the Nordic countries (Denmark, Finland, Norway and Sweden), seems to be low especially when compared to resistance in isolates reported from southern European countries (e.g. Spain), however comparison between prevalences in different *Campylobacter* species should be interpreted with caution.

Poultry

Antimicrobial resistance in *Campylobacter* isolates from poultry was reported by 10 countries (Tables AB CA3 and AB CA4, and and Level 3, Table AB CA11). For *C. coli* isolates from poultry (Table AB CA3) a high level of resistance was seen for quinolones, fluoroquinolones, tetracyclines and trimethroprim/sulfonamide. Some variation between countries was seen for macrolide and fluoroquinolone resistance. A generally high level of resistance was reported from Spain. For *C. jejuni* isolates from poultry (Table AB CA4) considerable variation between countries was seen for quinolones, penicillins, and macrolides. In general the prevalence of resistance in isolates reported from the Nordic countries (Denmark, Finland, Norway and Sweden) was low when compared to resistance in isolates reported from other countries. The proportion of fully sensitive isolates reported from the Nordic countries was high (80-95%).

Pigs

Antimicrobial resistance in *Campylobacter* isolates from pigs was reported by Austria, France, Hungary, Italy, Spain and The Netherlands (Table AB CA5 and Level 3, Table AB CA10). Among *C. coli* from pigs, high prevalence of resistance to tetracyclines (up to 96%) and fluoroquinolones (up to 83%) was reported and large variation between countries was observed for fluoroquinolones, macrolides, penicillins and tetracycline. Resistance in isolates reported from Spain and Ireland was generally high.

Cattle

Antimicrobial resistance in *Campylobacter* isolates from cattle was reported by Austria, Denmark, Hungary, Italy and United Kingdom. Among *C. coli* isolates from cattle (Level 3, Table AB CA5) reported by Austria and Italy, relatively high prevalence of resistance to quinolones, fluoroquinolones and tetracyclines was observed. However, due to small sample sizes this should be interpreted with care. Among *C. coli* isolates from cattle (Table AB CA6) large variation between countries was seen for tetracyclines (0-40%) and fluoroquinolones (2-42%). In contrast, very little variation was seen for resistance to macrolides (0.8-6%) and ampicillin (7.1-14%). Austria and Italy reported relatively high levels of resistance to fluoroquinolones and tetracycline compared to Denmark and United Kingdom. Hungary also reported relatively high prevalence of resistance to these antimicrobials, however direct comparison should be made with caution when more than one *Campylobacter* spp. is included.

Sheep

Data on antimicrobial resistance in *Campylobacter* isolates from sheep were provided by Italy (Level 3, Table AB CA8 and CA12). As for other animal species the prevalence of antimicrobial resistance was higher for quinolones, fluoroquinolones and tetracyclines than for other antimicrobials.

Table AB CA1. Antimicrobial resistance in *Campylobacter* from humans, 2004

	Country		B	DK	F	H	LT	N	NL
	Monitoring program		no	yes	yes	no	no	yes	yes
	No of isolates available		121	107[1]	5,088	13,045	957	104	3,273
Antimicrobial Group	Antimicrobial								
Aminoglycosides	Gentamicin	N	-	-	5,088	-	-	104	-
		%R	-	-	0.2	-	-	2.9	-
Fluoroquinolones	Ciprofloxacin	N	121	107	-	7,140	646	104	2,092
		%R	33	29	-	49.5	15.9	8.7	33
Macrolides	Erythromycin	N	121	107	5,088	9,818	646	104	1,848
		%R	7	5	3.4	1.3	0.9	3.8	2
Penicillins	Amoxicillin	N	-	-	-	195	-	-	-
		%R	-	-	-	15.4	-	-	-
	Ampicillin	N	-	-	5,088	9,139	646	-	-
		%R	-	-	39.3	24	13.1	-	-
Quinolones	Nalidixic acid	N	-	107	5,088	7,730	-	104	-
		%R	-	31	28.1	50	-	9.6	-
Tetracyclines	Doxycyclin	N	-	-	-	-	-	104	-
		%R	-	-	-	-	-	5.8	-
	Tetracycline	N	-	107	5,088	6,430	646	-	1,665
		%R	-	24	31.9	21.7	0.6	-	24.2
Multiresistant isolates	fully sensitives	%	-	-	-	21.7	54.5	88.5	-
	resistant to 1 antimicrobial	%	-	-	-	25.4	13.3	1.9	-
	resistant to 2 antimicrobials	%	-	-	-	22.7	17.8	2.9	-
	resistant to 3 antimicrobials	%	-	-	-	14.5	9.4	4.8	-
	resistant to 4 antimicrobials	%	-	-	-	6.24	5.1	1	-
	resistant to >4 antimicrobials	%	-	-	-	2.9	0	1	-

Note: Only selected antimicrobials are presented in the table. The percentage of multiresistant isolates is based on all antimicrobials tested. Tables containing results for all antimicrobials tested can be found in Level 3.
1. In Denmark *C. jejuni* isolates only.

Table AB CA2. Antimicrobial resistance in *Campylobacter* from broiler meat, 2004

	Country		B	DK	N	NL	UK
	Monitoring program		yes	yes	yes	no	no
	No of isolates available		197	103[1]	331	157	788
Antimicrobial group	Antimicrobial						
Aminoglycosides	Gentamicin	N	197	103	33	157	788
		%R	0	0	0	1	0
	Streptomycin	N	-	103	-	-	-
		%R	-	0	-	-	-
Fluoroquinolones	Ciprofloxacin	N	197	103	-	157	788
		%R	38	3	-	56	27
	Enrofloxacin	N	-	-	33	-	-
		%R	-	-	0	-	-
Macrolides	Erythromycin	N	197	103	33	157	788
		%R	3	0	0	3	8
Penicillins	Ampicillin	N	197	-	33	157	788
		%R	26	-	9.1	20	74
Quinolones	Nalidixic acid	N	197	103	33	157	788
		%R	39	3	0	50	29
Tetracyclines	Tetracycline	N	197	103	33	157	788
		%R	40	1	0	40	51
Multiresistant isolates	fully sensitives	%	36	-	90.9	10	14
	resistant to 1 antimicrobial	%	21	-	9.1	34	28
	resistant to 2 antimicrobials	%	15	-	0	24	15
	resistant to 3 antimicrobials	%	16	-	0	18	19
	resistant to 4 antimicrobials	%	12	-	0	10	7
	resistant to >4 antimicrobials	%	0	-	0	5	16

Note: Only selected antimicrobials are presented in the table. The percentage of multiresistant isolates is based on all antimicrobials tested. Tables containing results for all antimicrobials tested can be found in Level 3.
1. In Denmark *C. jejuni* isolates only.

Table AB CA3. Antimicrobial resistance in *C. coli* from poultry, 2004

	Country		A	F	H	I	ES	NL
	Monitoring program		yes	yes	yes	yes	no	yes
	No of isolates available		135	63	75[1]	32	31	21
Antimicrobials Group	Antimicrobials							
Aminoglycosides	Gentamicin	N	135	46	-	32	28	21
		%R	0.7	0	-	0	7	0
Amphenicols	Chloramphenicol	N	135	-	-	-	-	-
		%R	0	-	-	-	-	-
Fluoroquinolones	Ciprofloxacin	N	135	45	-	32	28	21
		%R	60.7	13	-	56.3	96	52
	Enrofloxacin	N	-	-	75	-	-	-
		%R	-	-	62.7	-	-	-
Macrolides	Erythromycin	N	135	46	75	32	31	21
		%R	9.6	4	3.9	40.6	19	5
Penicillins	Ampicillin	N	135	46	75	32	28	21
		%R	8.9	35	18.7	34.4	32	5
Polymyxins	Colistin	N	135	-	-	-	-	-
		%R	0.7	-	-	-	-	-
Quinolones	Nalidixic acid	N	135	46	-	32	28	21
		%R	52.6	28	-	50	96	52
Tetracyclines	Tetracyclin	N	135	46	75	32	28	21
		%R	39.3	61	40	56.3	86	57
Trimethoprim + Sulfonamides	Trimethoprim + Sulfonamide	N	135	-	-	-	-	-
		%R	16.3	-	-	-	-	-
Multiresistant isolates	fully sensitives	%	30.4	-	23.4	28.1	-	-
	resistant to 1 antimicrobial	%	14.1	-	32	15.6	-	-
	resistant to 2 antimicrobials	%	24.4	-	37.3	9.4	-	-
	resistant to 3 antimicrobials	%	20	-	5.3	12.5	-	-
	resistant to 4 antimicrobials	%	5.9	-	1.3	15.6	-	-
	resistant to >4 antimicrobials	%	5.2	-	-	18.8	-	-

Note: Only selected antimicrobials are presented in the table. The percentage of multiresistant isolates is based on all antimicrobials tested. Tables containing results for all antimicrobials tested can be found in Level 3.

Table AB CA4. Antimicrobial resistance in *C. jejuni* from poultry, 2004

	Country		A	DK	FIN	F	I	N	ES	S	NL
	Monitoring program		yes	yes	yes	yes	yes	yes	yes	yes	yes
	No of isolates available		211	77	74	62	50	75	18	94	57
Antimicrobial Group	Antimicrobials										
Aminoglycosides	Gentamicin	N	211	77	69	46	50	75	5	94	57
		%R	0	0	0	0	2	0	0	0	0
Amphenicols	Chloramphenicol	N	211	77	-	-	-	-	-	-	-
		%R	0	0	-	-	-	-	-	-	-
Fluoroquinolones	Ciprofloxacin	N	211	-	-	45	50	-	5	-	57
		%R	37	-	-	13	76	-	100	-	40
	Enrofloxacin	N	-	-	69	-	-	75	-	94	-
		%R	-	-	0	-	-	0	-	5.3	-
Macrolides	Erythromycin	N	211	77	69	46	50	75	18	94	57
		%R	0.9	1	0	4	18	0	28	0	0
Penicillins	Ampicillin	N	211	-	69	46	50	75	5	94	57
		%R	13.7	-	5.8	35	44	4	40	5.3	50
Polymyxins	Colistin	N	211	-	-	-	-	-	-	-	-
		%R	0	-	-	-	-	-	-	-	-
Quinolones	Nalidixic acid	N	211	77	69	46	50	75	5	94	57
		%R	36	5	4.3	28	58	0	100	5.3	40
Tetracyclines	Tetracyclin	N	211	77	69	46	50	-	5	94	57
		%R	26.5	5	10.1	61	80	-	20	0	46
Trimethoprim + Sulfonamides	Trimethoprim + Sulfonamide	N	211	-	-	-	-	-	-	-	-
		%R	5.7	-	-	-	-	-	-	-	-
Multiresistant isolates	fully sensitives	%	56.4	-	79.7	-	12	94.7	-	89.4	-
	resistant to 1 antimicrobial	%	7.6	-	20.3	-	8	5.3	-	5.3	-
	resistant to 2 antimicrobials	%	15.2	-	0	-	12	0	-	5.3	-
	resistant to 3 antimicrobials	%	15.2	-	0	-	32	0	-	0	-
	resistant to 4 antimicrobials	%	4.3	-	0	-	30	0	-	0	-
	resistant to >4 antimicrobials	%	1.4	-	0	-	6	0	-	0	-

Note: Only selected antimicrobials are presented in the table. The percentage of multiresistant isolates is based on all antimicrobials tested. Tables containing results for all antimicrobials tested can be found in Level 3.

Table AB CA5. Antimicrobial resistance in *C. coli* from pigs, 2004

	Country		A	F	H	I	ES	NL
	Monitoring program		yes	yes	yes	yes	no	yes
	No of isolates available		346	105	77[1]	60	113	199
Antimicrobial Group	Antimicrobials							
Aminoglycosides	Gentamicin	N	346	97	-	60	88	199
		%R	1.7	0	-	13.3	15.9	0
Amphenicols	Chloramphenicol	N	346	-	-	-	-	-
		%R	0.9	-	-	-	-	-
Fluoroquinolones	Ciprofloxacin	N	346	97	-	60	90	199
		%R	35.3	24	-	68.3	83.3	7
	Enrofloxacin	N	-	-	77	-	-	-
		%R	-	-	33.8	-	-	-
Macrolides	Erythromycin	N	346	97	77	60	113	199
		%R	15.9	78	19.5	71.7	66.4	18
Penicillins	Ampicillin	N	346	96	77	60	88	199
		%R	18.2	13	5.2	60	59.1	22
Polymyxins	Colistin	N	346	-	-	-	-	-
		%R	0.9	-	-	-	-	-
Quinolones	Nalidixic acid	N	346	97	-	60	89	199
		%R	32.4	38	77	58.3	86.5	8
Tetracyclines	Tetracycline	N	346	97	63.6	60	90	199
		%R	72.8	96	-	98.3	95.6	75
Trimethoprim + Sulfonamides	Trimethoprim + Sulfonamide	N	346	-	-	-	-	-
		%R	45.1	-	-	-	-	-
Multiresistant isolates	fully sensitives	%	48.8	-	25.3	0	-	-
	resistant to 1 antimicrobial	%	13.9	-	40.3	5	-	-
	resistant to 2 antimicrobials	%	6.1	-	27.3	13.33	-	-
	resistant to 3 antimicrobials	%	3.8	-	9.1	25	-	-
	resistant to 4 antimicrobials	%	7.5	-	-	21.6	-	-
	resistant to >4 antimicrobials	%	19.9	-	-	35	-	-

Note: Only selected antimicrobials are presented in the table. The percentage of multiresistant isolates is based on all antimicrobials tested. Tables containing results for all antimicrobials tested can be found in Level 3.
1. In Hungary including a few *C. jejuni* isolates.

Table AB CA6. Antimicrobial resistance in *C. jejuni* from cattle, 2004

	Country		A	DK	H	I	UK
	Monitoring program		yes	yes	yes	yes	yes
	No of isolates available		126	42	52[1]	50	284
Antimicrobial Group	Antimicrobials						
Aminoglycosides	Gentamicin	N	126	42	-	50	-
		%R	0	0	-	2	-
	Streptomycin	N	126	42	-	-	-
		%R	7.1	0	-	-	-
Amphenicols	Chloramphenicol	N	126	42	-	-	-
		%R	0.8	0	-	-	-
Fluoroquinolones	Ciprofloxacin	N	126	42	-	50	284
		%R	25.4	2	-	42	3
	Enrofloxacin	N	-	-	52	-	-
		%R	-	-	28.8	-	-
Macrolides	Erythromycin	N	126	42	52	50	284
		%R	0.8	0	5.8	6	3
Penicillins	Ampicillin	N	126	-	52	50	284
		%R	7.1	-	7.7	14	14
	Ampicillin/ Sulbactam	N	126	-	-	-	-
		%R	0.8	-	-	-	-
Polymyxins	Colistin	N	126	-	-	-	-
		%R	0	-	-	-	-
Quinolones	Nalidixic acid	N	126	42	-	50	284
		%R	27	2	-	26	8
Tetracyclines	Tetracycline	N	126	42	52	50	284
		%R	38.1	0	32.1	40	6
Trimethopri m + Sulfonamides	Trimethoprim + Sulfonamide	N	126	-	-	-	-
		%R	5.6	-	-	-	-
Multiresistant isolates	fully sensitives	%	65.9	-	53.8	44	74
	resistant to 1 antimicrobial	%	9.5	-	28.8	18	18
	resistant to 2 antimicrobials	%	7.1	-	17.3	12	5
	resistant to 3 antimicrobials	%	11.1	-	-	18	1
	resistant to 4 antimicrobials	%	4.8	-	-	6	1
	resistant to >4 antimicrobials	%	1.6	-	-	2	1

Note: Only selected antimicrobials are presented in the table. The percentage of multiresistant isolates is based on all antimicrobials tested. Tables containing results for all antimicrobials tested can be found in Level 3.
1. In Hungary including 9 *C. coli* isolates.

3.2.5. Summary on Campylobacter

For human campylobacteriosis cases, the most comparable data are from countries in which notification of all diagnosed human cases occur. Using only these data, the number of human cases in EU-15 MS appeared to have increase by 19.6% from 2003 to 2004. The same trend is also seen in several individual MS. Seven of the new MS reported the number of human cases for 2004. With the exception of Czech Republic, who reported the highest incidence of human campylobacteriosis in the EU, the new MS reported incidences within ranges previously reported by EU-15 MS.

The majority of data on the prevalence of *Campylobacter* in food and animals originates from poultry and poultry products. Poultry is assumed to be one of the main sources of human campylobacteriosis and monitoring focus is therefore aimed at this sector of the food production. In meat, the highest prevalences were reported in poultry meat, whereas the prevalences in pig and bovine meat were considerably lower. *Campylobacter* were also isolated from a variety of other foodstuffs such as fishery products (bivalve molluscs), cheeses and vegetables.

Comparison between MS, or from year to year within the same MS, is difficult due to the variability of the monitoring systems. However, in recent years the MS has reported increasing amounts of data on the prevalence for this pathogen in animals and food.

The reporting of antimicrobial resistance in *Campylobacter* from the MS and Norway, demonstrates the presence of a reservoir of resistant bacteria in food animals, which implies a potential risk for foodborne transmission to humans. Subsequent emergence of infections in humans, caused by resistant bacteria originating from the animal reservoir, is of great concern as effective treatment may be compromised.

Campylobacter isolates resistant to fluoroquinolones and macrolides were detected from animals and meat from some MS, and this resistance is especially undesirable, as these drugs are used frequently to treat human campylobacteriosis. In some MS, the use of fluoroquinolones in food animals is restricted in order to minimise emergence and spread of resistance. The large differences between countries in the occurrence of resistance to quinolones, fluoroquinolones and tetracyclines in *Campylobacter* may likely be attributed to differences in antimicrobial consumption in food animals in the countries, and to differences in policies of antimicrobial use.

3.2.6. Sources of Campylobacter data

With the exception of France, Germany, The Netherlands and the United Kingdom, human campylobacteriosis is notifiable in all MS and Norway (see Appendix Table CA2). Luxembourg, Malta, Poland and Portugal provided no information. Most MS have had notifications systems in place for many years. However Cyprus and Ireland have implemented their notification systems within recent years (2003-2005). It should be noted, that Italy, despite a notification system, reports no or very few cases annually. Diagnosis of human infections is generally done by culture from human stool samples (see Appendix Table CA1). In some countries isolation of the organism is followed by biochemical tests for speciation.

Campylobacter is notifiable in *Gallus gallus* in Finland and Norway, and in all animals in Belgium, Estonia, Latvia, Lithuania, Slovenia, Spain and The Netherlands.

Testing for the presence of *Campylobacter* was predominantly carried out on fresh meat using the bacteriological methods ISO 10272:1995, as well as NMKL 119:1990 (see Appendix Table CA1 for further details). For poultry sampled prior to slaughter, faecal material was collected either as cloacal swabs or sock samples (faecal material collected from the floor of poultry houses by pulling gauze over footwear and walking through the poultry house). At slaughter, several types of samples were collected including cloacal swabs, caecal contents, whole intestines and/or neck skin.

Foodstuff samples are collected in several different contexts, i.e. continuous monitoring or control programmes, screenings, surveys and as part of HACCP programmes implemented within the food industry (see Appendix Table CA1 for further details).

Data on the occurrence of antimicrobial resistance in *Campylobacter* were provided by the following countries: Austria, Belgium, Denmark, Finland, France, Hungary, Italy, Lithuania, Norway, Spain, Sweden, The Netherlands and United Kingdom. These 13 countries reported results of antimicrobial susceptibility testing of *Campylobacter* isolates from humans, various animal species and from various foods. Results were requested for the Community Zoonoses Report as percentage of resistant isolates out of the total number of isolates tested against each antimicrobial for each bacterial species in each specific sample category. In contrast to previous years, countries were not confined to reporting on a defined panel of antimicrobials or specific sample categories. This has implied large heterogeneity of data on antimicrobial resistance reported for 2004. In order to preserve comparability of data between countries, categories in which several countries reported was selected for this summary. Furthermore, categories were selected based on their relative importance.

With the exception of a few sample categories, all countries providing antimicrobial susceptibility data on *Campylobacter* in 2004 generated the data through monitoring programmes. Except for Austria, Belgium and Lithuania, using disc diffusion method for testing of isolates from humans, all countries used dilution (MIC) methods for antimicrobial susceptibility testing of *Campylobacter* isolates. Breakpoints, concentrations and range of dilutions applied in individual countries for antimicrobial susceptibility testing are presented in Level 3, Table AB CA13.

3.3. Listeria

The genus *Listeriae* comprises six species, but human cases are almost exclusively caused by the species *Listeria monocytogenes*. *Listeriae* are ubiquitous organisms, which are widely distributed in the environment, especially in plant matter and soil.

In humans, infections most often affect the pregnant uterus, the central nervous system or the bloodstream. Symptoms vary; ranging from mild flu-like symptoms and diarrhoea to life threatening infections characterised by septicaemia and meningoencephalitis. In pregnant women, the infection spreads to the foetus, which will either be born severely ill or die in the uterus resulting in abortion. Illness is often severe and mortality is high. Human infections are rare, but are important because of the high mortality rate associated with them. These organisms are amongst the most important causes of death from foodborne infections in industrialised countries.

The main route of transmission to both humans and animals is believed to be through consumption of contaminated food or feed, however infection can also be transmitted directly from infected animals to humans as well as between humans. Cooking kills *Listeria*, but the bacteria are known to multiply at chilling temperatures up to 2-4°C, which makes its occurrence in ready-to-eat foods with a relatively long shelf life, particularly important.

In domestic animals (especially sheep and goats) clinical listeriosis is usually presents as encephalitis, abortion, mastitis or septicaemia.

3.3.1. Listeriosis in humans

In 2004, all MS and Norway except Cyprus, Luxembourg and Malta reported cases of listeriosis. Data reported here include all MS and Norway. There were 1,267 cases of listeriosis in the EU, which represents an incidence of 0.3 cases per 100,000 population. This is the same incidence as 2003. Incidences by country are reported in Table LI1, and ranged from 0.03 in Greece, Lithuania and Poland to 0.8 in Denmark.

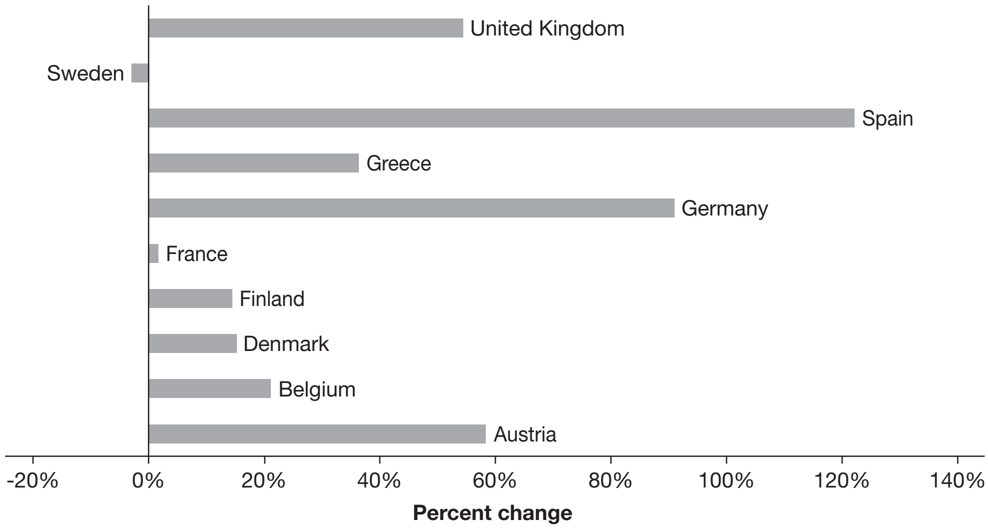
Table LI1. Reported cases of listeriosis in humans, 1999-2004, and incidence in 2004[1]

	2004 Cases/ 100,000 population	2004	2003	2002 Number of cases	2001	2000	1999
Austria	0.2	19	8	16	9	14	13
Belgium	0.7	70	76	44	57	48	64
Cyprus	-	-	-	-	-	-	-
Czech Republic	0.2	16	-	-	-	-	-
Denmark	0.8	41	29	28	38	39	44
Estonia	0.2	2	-	-	-	-	1
Finland	0.7	35	41	20	28	18	46
France	0.4	236	220	218	187	261	275
Germany[2]	0.4	295	255	237	216	33	31
Greece	<0.1	3	0	5	3	2	1
Hungary	0.2	16	-	-	-	-	-
Ireland	0.3	11	6	6	7	7	
Italy	<0.1	25	0	-	31	13	17
Latvia	0.2	5	8	-	-	36	-
Lithuania	<0.1	1	2	-	-	-	-
Luxembourg	-	-	-	-	-	-	-
Malta	-	-	-	-	-	-	-
Poland	<0.1	10	-	-	-	-	-
Portugal	0.4	38	-	-	-	-	-
Slovakia	0.2	8	-	-	-	-	-
Slovenia	<0.1	1	6	-	-	-	-
Spain[3]	0.2	100	52	49	57	35	32
Sweden	0.5	44	48	39	67	46	27
The Netherlands	0.3	55	52	32	16		
United Kingdom	0.4	236	243	150	156	115	116
EU-Total	**0.3**	**1,267**	**1,046**	**844**	**872**	**586**	**667**
Norway	0.5	21	18	17	18	-	-

1. EU-Total incidence is based on population in reporting countries.
2. In Germany, cases were reported through a revised reporting system from 2001.
3. In Spain, only hospitalised cases are notifiable.

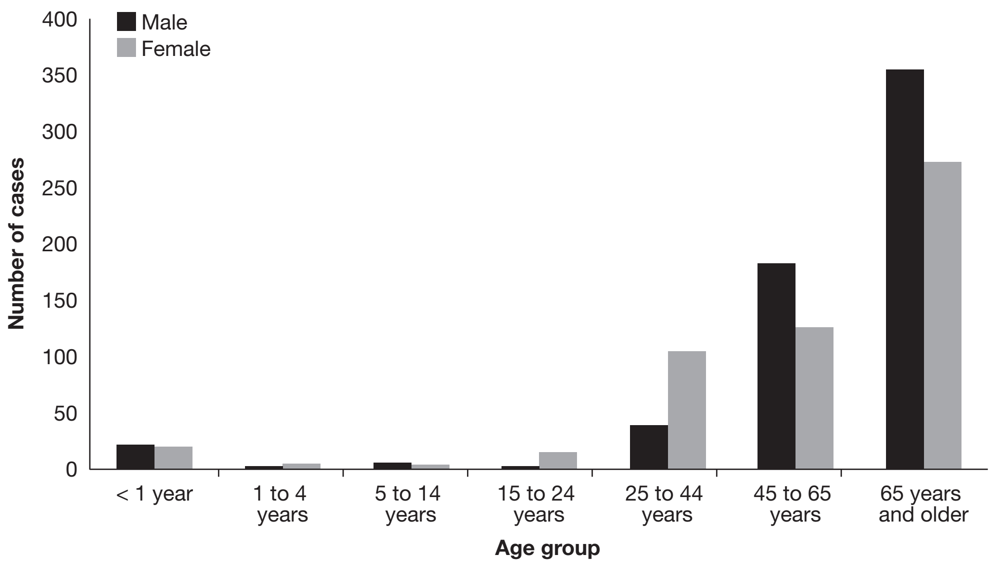
For those MS where data was available for the last five years, the reported incidence in 2004 was compared to the mean of the previous five years (Figure LI1). All MS, with the exception of Sweden, reported an increase in the incidence of listeriosis. The most notable increase was reported from Spain (Figure LI1).

Figure LI1. Percent change in reported incidence of human listeriosis in 2004 compared to the previous five-year mean (1999-2003)



Fifty-one per cent of the reported listeriosis cases were in people aged 65 years or older (Figure LI2). Males and females are represented equally among the cases. There were 55 cases associated with pregnancy, mothers and babies, reported by nine countries. A total of 107 (8.3%) deaths were reported. Mortality from listeriosis is usually higher, but under-reporting of deaths may occur in MS.

Figure LI2. Number of human cases of listeriosis by age and sex, 2004



All reported data on listeriosis in humans are presented in Level 3, Table LI1 and LI2.

3.3.2. Listeria in food

Findings of *Listeria monocytogenes* are important in three main scenarios: presence of *L. monocytogenes* on surfaces that come in direct contact with food, presence of *L. monocytogenes* in foods that are ready-to-eat (RTE) and can sustain growth of the bacterium and findings of *L. monocytogenes* in concentrations greater than 100 colony forming units per gram (cfu/g) in RTE. Findings of *L. monocytogenes* in concentrations less than 100 cfu/g in RTE are usually not considered significant for human disease, except in vulnerable population groups.

Testing for the presence of *L. monocytogenes* in food was reported by 21 MS and Norway. Most results come from official food controls and own controls by the food industry, where high numbers of foodstuffs have been tested for *L. monocytogenes*.

Findings of *L. monocytogenes* in the processing environment, on food contact surface areas, may be a source of contamination and be an indication of inadequate hygiene. Usually *L. monocytogenes* was detected very seldom, in less than 1% of the environmental samples, but up to 27.6% positive samples were reported by one country. Data from environmental results will not be presented here but is available in the Level 3, Table LI3.

Data presented here focuses on ready-to-eat foods with any findings of *L. monocytogenes* for qualitative data, and findings of *L. monocytogenes* with more than 100 cfu/g for quantitative data.

Table LI2 summarises the range of results for qualitative *Listeria* findings in food. Data may not be directly comparable between years.

Table LI2. *L. monocytogenes* in food in 2003 and 2004 based on all positive findings of the bacterium in the 21 MS and Norway reporting data

Food item	Positive findings (range) 2004	Positive findings (range) 2003
Bovine meat products, ready-to-eat	0-48.6%	0-10.7%
Pig meat products, ready-to-eat	0-27.6%	0-6.1%
Other meat, ready-to-eat	0-29.1%	0-21.5%
Poultry meat products, ready-to-eat	0-40%	0-32.3%
Cheeses	0-12.5%	0-4.8%
Raw milk	0-100%	0-0.3%
Dairy products, ready-to-eat	0-0.6%	-
Fishery products	0-29.8%	0-13.2%
Fruits and vegetables	0-33.3%	0-1.3%

Data presented in tables LI3a-d is qualitative data where over 500 samples were tested and quantitative data where more than 25 samples were tested (including the use of a sample weight of 0.01g, which is considered to be equivalent to testing for >100 cfu/g). All other data is available in detail in Level 3, Table LI3.

Ready-to-eat products of meat origin

Data on testing for *L. monocytogenes* in RTE products from red meat and poultry meat was available from 15 MS. Testing results are categorised to sampling at the retail level and at the processing plant.

Belgium carried out a survey for *L. monocytogenes* in 2004. More than 100 meat-cutting plants and 200 retail facilities representative of the Belgian production of carcasses and meat were sampled. Samples were taken from seven products: minced bovine meat, minced pig meat, chicken meat preparation, cooked ham, paté, salami and smoked salmon. *L. monocytogenes* was detected in 5% of samples across all foods. For detailed results see Table LI3a-d and Level 3, Table LI3.

Qualitative data results ranged considerably. The highest reported were from Portugal, where 48.6% (17 out of 35) of 25g samples of RTE bovine meat were positive. Large numbers of RTE bovine meat samples were tested in Germany (2,825) with a prevalence of 13.3% reported (Table LI3a).

Quantitative data was reported from ten countries in RTE meat products: Austria, Czech Republic, Denmark, Germany, Italy, Ireland, Poland, Portugal, Slovakia and Spain. Belgium used a semi-quantitative method able to identify samples over >100 cfu/g. (Table LI3a-d) *L. monocytogenes* in concentrations greater than 100 cfu/g was usually reported in small numbers. The highest reported was in Poland who reported 8.7% (2 out of 23) of tested pig meat products had concentrations more than 100cfu/g (data not shown). Spain tested 676 RTE pig meat products with 36 (5.4%) results greater than 100 cfu/g.

Table LI3a. *L. monocytogenes* in ready-to-eat products of bovine meat[1], 2004

		N	Positive	% Pos	>100 cfu (%)
Austria	Meat products, ready-to-eat, at retail, (sample weight: 25g)	25	1	4.0	1 (4.0)
Belgium	Meat products (carpaccio at retail) (sample weight: 0.01 g)	95	0	-	0
	Meat preparation, ready-to-eat, at retail (sample weight: 0.01 g)	110	0	-	0
	Meat products, ready-to-eat, at retail, (sample weight: 0.01 g)	98	2	2.0	2 (2,0)
Germany	Meat products, ready-to-eat, at processing, (sample weight: 25g)	711	42	5.9	-
	Meat products, ready-to-eat, at retail, (sample weight: 25g)	2,825	375	13.3	-
Italy	Meat products, ready-to-eat, at processing, (sample weight: 25g)	804	26	3.2	-
Ireland	Meat products, ready-to-eat, at retail, qualitative/quantitative method	615/640	17	2.8	3 (0.47)

1. Only qualitative data where over 500 samples were tested and quantitative data where more than 25 samples were tested are presented (including the use of a sample weight of 0.01g, which is considered to be equivalent to testing for >100 cfu/g).

Table LI3b. *L. monocytogenes* in ready-to-eat products of pig meat[1], 2004

		N	Positive	% Pos	>100 cfu (%)
Belgium	Cooked ham, at retail (sample weight: 0.01 g)	350	1	0.3	1 (0.3)
	Fermented sausage, at retail (sample weight: 0.01g)	78	1	1.3	1 (1.3)
	Minced meat, ready-to-eat, at retail (sample weight: 0.01 g)	152	8	5.3	8 (5.3)
	Meat preparation, ready-to-eat, at retail, (sample weight: 0.01 g)	326	3	0.9	3 (0.9)
Czech Republic	Meat products, ready-to-eat, at retail, (sample weight: 25g), salami, sausages	204	8	3.9	1 (0.5)
Italy	Meat products, ready-to-eat, at processing, (sample weight: 25g)	1,551	43	2.8	-
	Meat products, ready-to-eat, at retail, (sample weight: 25g)	2,700	100	3.7	-
	Meat products, ready-to-eat, at processing, HACCP (sample weight: 25g	2,006	12	0.6	-
Ireland	Meat products, ready-to-eat, at processing	7,659	0		-
	Meat products, ready-to-eat, at retail, qualitative/quantitative method	1,567/1,587	64	4.1	4 (0.3)
Portugal	Meat products, ready-to-eat, at processing plant, (sample weight: 25g)	25	-	-	2 (8.0)
Spain	Meat products, ready-to-eat, at processing plant, (sample weight: 25g)	676	-	-	36 (5.3)

1. Only qualitative data where over 500 samples were tested and quantitative data where more than 25 samples were tested are presented (including the use of a sample weight of 0.01g, which is considered to be equivalent to testing for >100 cfu/g).

Table LI3c. *L. monocytogenes* in ready-to-eat products of poultry meat[1], 2004

		N	Positive	% Pos	>100 cfu (%)
Czech Republic	Meat products, ready to eat, at retail, (sample weight: 25g), salami, sausages	36	1	2.8	1 (2.8)
Italy	Meat products, ready-to-eat, at processing, (sample weight: 25g)	718	8	1.1	-
Ireland	Meat products, ready-to-eat, at processing	3,720	1	0.0	-
	Meat products, ready-to-eat, at retail, qualitative/quantitative method	1,601/1,667	27	1.7	2 (0.1)

1. Only qualitative data where over 500 samples were tested and quantitative data where more than 25 samples were tested are presented (including the use of a sample weight of 0.01g, which is considered to be equivalent to testing for >100 cfu/g).

Table LI 3d. *L. monocytogenes* in ready-to-eat products of other meat[1], 2004

		N	Positive	% Pos	>100 cfu (%)
	MEAT FROM SHEEP				
Ireland	Meat products, ready-to-eat, at retail, qualitative/quantitative method	46/49	1	2.2	2 (4.1)
	RED MEAT				
Germany	Meat products, heat-treated, (sample weight: 25g)	2,382	44	1.9	2 (0.1)
	Meat products, stabilised, (sample weight: 25g)	3,161	224	7.1	6 (0.2)
	MIXED MEAT				
Ireland	Meat products, ready-to-eat, at retail, qualitative/quantitative method	102/104	5	4.9	3 (2.9)

1. Only qualitative data where over 500 samples were tested and quantitative data where more than 25 samples were tested are presented (including the use of a sample weight of 0.01g, which is considered to be equivalent to testing for >100 cfu/g).

Milk and dairy products

Qualitative data on *L. monocytogenes* in raw milk intended for direct human consumption was provided by 11 MS. All countries, except Estonia, reported proportions of positive samples of less than 7%. Estonia reported 2 of 2 samples positive for *Listeria*. Poland tested 2,474 samples and found only one positive sample (0.04%). Hungary also reported large numbers of samples with low prevalence detected (38 positive out of 2,285). See text box for results from two dairy product surveys from the United Kingdom.

The United Kingdom conducted two surveys in 2004. A study of butter from production, retail and catering premises was carried out over two months in 2004. Thirteen of 3,229 (0.4%) of the butter samples were positive for *L. monocytogenes*; all of these were below 10 cfu/g. The second survey tested cheeses made of raw or thermised milk. *L. monocytogenes* was detected in 0.97% (18/1,842) samples. Two samples contained *L. monocytogenes* above 100 cfu/g.

Austria was the only MS to provide quantitative data for raw milk intended for direct human consumption. They found no positive results from 66 samples tested.

In 2004, sixteen MS reported large numbers of other RTE dairy products, including cheese (Table LI4), tested for *L. monocytogenes*. Council Directive 92/46/EEC sets down a criterion of absence of *L. monocytogenes* in 25g for cheeses and other RTE dairy products. Finland reported that 5 of 90 samples of soft and semisoft cheeses made from raw or thermised milk tested at processing had levels greater than 100 cfu/g. Detailed data are provided in Level 3, Table LI1.

Table LI4. ***L. monocytogenes*** **in cheeses, 2004**

	Cheeses	N	Positive	% Pos	>100 cfu (%)
	MADE FROM RAW OR THERMISED MILK				
Belgium	At retail, (sample weight 0.01g)	147	0	-	-
Germany	At process, (sample weight 25 g)	36	0	0	-
	At retail, (sample weight 25 g)	149	1	0.7	-
Finland	Soft and semisoft, at process, (sample weight 25 g)	90	5	5.6	5(5.6)
	Soft and semisoft, at retail, (sample weight 25 g)	60	0	-	-
United Kingdom	At process, (sample weight 25 g)	25	1	4.0	1 (4.0)
	At retail, (sample weight 25 g)	1,817	17	0.9	1 (0.1)
	MADE FROM PASTEURISED MILK				
Finland	Soft and semisoft, at process, (sample weight 25 g)	42	0	-	-
	Soft and semisoft, at retail, (sample weight 25 g)	90	0	-	-
	UNSPECIFIED				
Austria	At retail, (sample 25g)	1,666	16	1.0	4 (0.3)
	Hard, at process, (sample weight 1 g)	653	11	1.7	3 (0.5)
Hungary	At process, (sample weight 25 g)	2,744	15	0.6	-
Italy	At process, (sample weight 25 g)	3,652	33	2.0	3 (0.8)
	At retail, (sample weight 25 g)	2,258	18	0.8	-
Ireland	At process	1,513	13	0.9	-
	At retail, qualitative method	894	34	3.8	-
	At retail, quantitative method	901	-	-	2 (0.2)
Malta	At process, (sample weight 25 g)	249	2	0.8	-
Norway	At process, (sample weight 25 g)	1,875	3	0.2	-
	At retail, (sample weight 25 g) imported data	1,856	6	0.4	-
Slovakia	At retail, (sample weight 25 g)	3,196	10	0.3	-

Fishery products

Fishery products, in particular lightly preserved fish products and products cooked before packaging, have been identified as products at risk of contamination with *L. monocytogenes.* As a result, a number of MS have conducted special surveys in fishery products (see text box for an example from Denmark).

In 2004, sixteen MS reported on *L. monocytogenes* findings in fishery products (Table LI5). Products tested were mainly cold-smoked fish products. Some MS also tested fish, crabs and prepared meals. Estonia reported the highest rate of contamination with 22.9% (25/109) of positive samples (data in Level 3, Table LI3).

Six MS provided quantitative data. Sweden reported 20.0% (13 out of 65) smoked fish samples tested at retail were positive at concentrations above 100 cfu/g. Finland also reported significant positive findings in cold smoked fish samples (3.2% of samples >100 cfu/g).

In 2004, Denmark conducted a study on smoked and marinated fish products. A total of 1,339 samples were analysed. *Listeria* monocytogenes was detected in 10.3% of samples. A total of 0.2% of samples had greater than 100 cfu/g detected.

Table LI5. *L. monocytogenes* in fishery products, 2004

	Ready-to-eat fishery products	N	Positive	% Pos	>100 cfu (%)
	FISH				
Austria	Smoked, at retail, (sample weight: 25g)	382	35	9.2	3 (0.8)
Belgium	Smoked salmon at the end of shelflife, at retail, (sample weight: 0.01g)	59	2	3.4	2 (3.4)
Finland	Cold smoked, at retail, survey, (sample weight 25g):	279	48	17.2	9 (3.2)
	Gravad/slight salted, at retail, survey, (sample weight 25g):	285	41	14.4	5 (1.7)
	Roe, at retail, survey, (sample weight 25g):	29	0	-	-
Italy	Smoked, at retail, (sample weight: 25g)	79	9	11.4	-
Ireland	Smoked, at process, qualitative method	44	1	2.3	-
	Smoked, at retail, qualitative method	29	2	6.9	-
Sweden	Smoked, at retail	65	-	-	13 (20.0)
	OTHER FISHERY PRODUCTS				
Austria	At retail, (sample weight: 25g)	772	25	3.2	1 (0.1)
Belgium	At retail, (sample weight: 0.01g)	121	2	1.7	2 (1.7)
Germany[1]	Sample weight 25g	3,781	235	6.2	20 (1.0)
Italy	At process, (sample weight 25g):	729	7	1.0	-
Ireland	At retail, qualitative/quantitative method	439/460	18	4.1	0

1. In Germany, the quantitative results are based on 2,060 samples only.

Other ready-to-eat products

MS reported a variety of other RTE products tested for *L. monocytogenes* (Table LI6). For complete data see Level 3, Table LI3. Rates of detection of *L. monocytogenes* were low. However, of special interest is that Ireland found in fruits and vegetables 0.9% of the samples harbouring *L. monocytogenes* over 100 cfu/g.

Table LI6. *L. monocytogenes* in other ready-to-eat products, 2004

	Other ready-to-eat products	N	Positive	% Pos	>100 cfu (%)
Ireland	Cereals and bakery products, at retail, qualitative/quantitative method	429/529	11	2.6	0
	Fruits and vegetables, at retail, qualitative/quantitative method	279/320	13	4.7	3 (0.9)
Czech Republic	Salads with dressing, qualitative method	24	4	16.7	-
Ireland	Egg products at retail, qualitative/quantitative method	460/472	13	2.8	0
	Ices and deserts at retail, qualitative/quantitative method	181/251	3	1.7	0
	Prepared food, at retail, qualitative/quantitative method	2,627/2,871	112	4.3	1 (0.03)
	Soups, at retail, qualitative/quantitative method	354/372	1	0.3	0
Sweden	Prepared food, quantitative method	30	-	-	2 (5.8)
Italy	Other RTE product, (sample weight: 25g), qualitative method	976	11	1.1	-

3.3.3. Listeriosis in animals

Cases of listeriosis in animals were reported in Sweden, mainly in sheep.

3.3.4. Summary on Listeria

Listeriosis is an important disease in Europe due to high morbidity and mortality in vulnerable populations, although it remains a relatively rare disease in the EU. The reported incidence of human listeriosis in 2004 was the same as in 2003. However, in countries with several years of data the incidence of human listeriosis reported has increased in 2004 when compared with the mean of the previous five years.

The lower than expected reported mortality rate (8.3%) might be due to a lack of data on patient outcomes after the initial notification. To assess the burden of listeriosis in the EU community better harmonisation of data collection systems is required.

All new MS, except Cyprus and Malta, reported listeriosis for the first time in 2004. Listeriosis reported by new MS represented only 6.7% of all cases reported. It is likely that the number of cases reported would increase as surveillance systems in these countries improve.

Testing for the presence of *L. monocytogenes* in food was performed in 21 MS and Norway. Qualitative results range from 0-100%. Foodstuffs that are contaminated with more than 100 *L. monocytogenes* bacteria per gram, and that are to be consumed without further heat-treatment are considered to form a direct risk to human health. In this aspect, most significant findings are reported from fishery products with up to 20% of samples positive for *L. monocytogenes* at concentrations greater than 100 cfu/g. Results higher that 100 cfu/g were also reported from cheeses, some meat products and other foodstuffs. These food categories have been typically identified as risk products for contamination with *Listeria*.

MS conduct and report food-testing data variably. Some MS conduct large surveys with numerous samples whilst others report very small numbers. Data on sample sizes and testing protocols was not always provided and so comparison between MS is difficult. The majority of MS report qualitative data only i.e. the presence or absence of *L. monocytogenes* in food. It is generally considered that concentrations of *L. monocytogenes* greater than 100 cfu/g are required to cause human disease in healthy populations, therefore qualitative results alone are not necessarily an indicator of risk.

3.3.5. Sources of Listeria data

Listeriosis is a notifiable disease in humans in all MS and Norway, with the exception of Cyprus, The Netherlands and the United Kingdom. Luxembourg did not provide any data in 2004. See the Appendix, Table LI2.

Listeria in animals is notifiable in 11 MS: Belgium, Estonia, Finland, Greece, Latvia, Lithuania, Slovakia, Slovenia, Spain, Sweden and The Netherlands, and Norway.

Testing for the presence of *Listeria* in food is reported in all MS and Norway. Details of testing and surveillance programmes are found in Appendix, Table LI1. Surveillance in ready-to-eat foods is performed in most MS. Data reported here focus on *Listeria* findings in foods considered to be a risk to human health.

3.4. Verotoxigenic Escherichia coli

Verotoxigenic *Escherichia coli* (VTEC) are strains of the bacterium *E. coli* capable of producing certain cytotoxins. Enterohemorrhagic *E. coli*, commonly referred to as EHEC, are a subset of the VTEC harbouring additional pathogenic factors. Over 150 different serotypes of VTEC have been associated with human illness. The majority of reported outbreaks and sporadic cases of VTEC infections have been associated with serotype O157. The spectrum of symptoms associated with VTEC infections ranges from mild to bloody diarrhoea, often accompanied by severe abdominal cramps but usually without fever. VTEC infection can also result in haemolytic uraemic syndrome (HUS). HUS is characterised by acute renal failure, anaemia and lowered platelet counts. HUS develops in up to 10% of patients infected with VTEC O157 and is the leading cause of acute renal failure in young children.

Infection may be acquired through consumption of contaminated food (predominantly bovine meat and raw milk) or water, or by direct transmission from person to person or from infected animals to humans.

Animals may be infected without displaying symptoms. Cattle and calves are usually asymptomatic carriers and are probably the main reservoir of strains associated with human disease. However, VTEC strains have also been found in other animals such as sheep, goats, pigs and wild game.

3.4.1. VTEC in humans

Human cases of VTEC infections were reported by 18 countries (17 MS and Norway). In 2004, a total of 4,143 laboratory-confirmed VTEC cases was reported, yielding a community incidence of 1.3 cases per 100,000 population. The highest incidence, 17.1 cases per 100,000 population, was reported by the Czech Republic. The remaining MS reported incidences ranging from 0.1 to 3.0.

For 10 MS reporting cases of VTEC infections both in 2004 and 2003, there were 2,294 laboratory confirmed VTEC cases reported in 2004 compared to 2,377 cases in 2003. In 2004, 50% of the cases were caused by VTEC O157 and 25% by other VTEC serotypes. This distribution is similar to what was reported for 2003. For the remaining cases, no information on the serotype distribution was available (Table VT1). The laboratory-diagnostic methods used by the MS to detect VTEC are usually specific for VTEC O157. Therefore, VTEC serotypes other than O157 may well be underreported.

In Austria, the number of human VTEC non-O157 cases in 2004 almost tripled compared to 2003 (10 to 32 cases), while the number of O157 cases remained at approximately the same level (18 to 13). This increase could possibly be attributed to two outbreaks involving environmental transmission and animal contact.

In Denmark, incidence of this disease has been steadily increasing since 1997, in part due to improvements in diagnostic methods and reporting systems. The number of reported VTEC cases increased by 27% in 2004 compared to 2003. This increase was mainly attributed to an outbreak caused by contaminated pasteurised milk.

Table VT1. Reported cases of laboratory confirmed VTEC infections, except HUS, in humans, 2003 and 2004, and incidences[1] in 2004

	2004	2004			2003		
	Cases/ 100,000 population	No. of laboratory confirmed cases	% O157	% Other VTEC	No. of cases	% O157	% Other VTEC
Austria	0.6	45	29	71	28	64	36
Belgium	0.3	36	56	44	39	36	64
Cyprus	-	-	-	-	-	-	-
Czech Republic	17.1	1,743	18	0	-	-	-
Denmark	3.0	163	27	73	128	21	79
Estonia	0	0	0	0	0	0	0
Finland	0.2	10	40	60	14	43	57
France	-	-	-	-	-	-	-
Germany	1.1	903	10	42	1,100	11	39
Greece	-	-	-	-	-	-	-
Hungary	<0.1	7	71	29	-	-	-
Ireland	1.4	57	88	12	90	93	7
Italy	0	3	100	0	5	40	60
Latvia	-	-	-	-		-	-
Lithuania	-	-	-	-	-	-	-
Luxembourg	-	-	-	-	-	-	-
Malta	-	-	-	-	-	-	-
Poland	0.2	81	99	1	-	-	-
Portugal	-	-	3 cases	22 cases	9	0	100
Slovakia	0.3	16	0	100	-	-	-
Slovenia	0.1	2	-	-	-	-	-
Spain	-	-	-	-	-	-	-
Sweden[2]	1.7	149	-	-	52	-	-
The Netherlands	0.2	30	100	0	51	98	-
United Kingdom	1.5	898	99	1	870	93	1
EU-Total	**1.3**	**4,143**	**-**	**-**	**2,401**	**-**	**-**
Norway	0.3	12	7	5	15	80	20

1. EU-Total incidence is based on population in reporting countries.
2. Prior to 2004, only VTEC 0157 was notifiable in Sweden.

Table VT2. Reported cases of HUS caused by VTEC infections in humans, 2003 and 2004, and incidences[1] in 2004

	2004	2004			2003		
	Cases/ 100,000 population	No. of cases	% O157	% Other VTEC	No. of cases	% O157	% Other VTEC
Austria	0.12	10	90	10	11	91	9
Belgium	<0.1	9	100	0	8	88	13
Cyprus	-	-	-	-	-	-	-
Czech Republic	-	-	-	-	-	-	-
Denmark	<0.1	5	60	40	3	100	0
Estonia	0	0	0	0	0	0	0
Finland	-	-	-	-	1	0	100
France	0.10	61	82	18	51	82	35
Germany	<0.1	42	67	10	61	72	10
Greece	0.76	84	-	-	-	-	-
Hungary	<0.1	2	0	100	-	-	-
Ireland	0.10	4	50	50	5	80	20
Italy	<0.1	17	24	76	13	8	92
Latvia	-	-	-	-	-	-	-
Lithuania	-	-	-	-	-	-	-
Luxembourg	-	-	-	-	-	-	-
Malta	-	-	-	-	-	-	-
Poland	-	-	-	-	-	-	-
Portugal	-	-	1 case	1 case	3	0	100
Slovakia	-	-	-	-	-	-	-
Slovenia	-	-	-	-	-	-	-
Spain	-	-	-	-	-	-	-
Sweden	<0.1	5	100	0	6	100	-
The Netherlands	<0.1	5	100	0	7	100	-
United Kingdom	<0.1	37	95	5	32	84	3
EU-Total	**<0.1**	**281**			**203**		
Norway	<0.1	1	100	2	50	50	

1. EU-Total incidence is based on population in reporting countries.

A total of 281 laboratory-confirmed HUS cases were reported in 13 MS, of which VTEC O157 caused 53% of the cases, and 13% were caused by other VTEC serotypes. The overall incidence of HUS caused by VTEC in 2004 was 0.1. In the 10 MS reporting cases of HUS in 2004 and 2003, the number of cases remained at the same level in the two years, 195 and 199, respectively (Table VT2).

Of the new MS, this disease became notifiable in Lithuania in 2004. In Hungary, since 2000, half of the public health laboratories routinely screen primary faecal cultures for verotoxin. Slovakia performs targeted investigations based on clinical suspicion.

The non-MS, Norway, reported 13 cases of VTEC, one of which was a HUS case.

For additional information on data provided on VTEC in humans, please, refer to Level 3, Table VT1 and VT2.

3.4.2. VTEC in food

Testing for the presence of VTEC in food was performed in 18 MS and Norway. In total, there were 41,929 foodstuff samples tested, and 1% of these were positive for VTEC. Cyprus, Estonia, Norway, Slovenia and Sweden did not detect any VTEC in food from the samples tested, which varied by types of food sampled and number of samples collected. The Czech Republic, France, Latvia, Lithuania, Luxembourg, Malta and the United Kingdom did not report data for VTEC in food. All data results for food are summarised in Level 3, Table VT3. Only results deriving from more than 25 samples tested are addressed below.

The sampling and testing procedures varied between the countries, and therefore the results from the different MS are not directly comparable.

Nine MS provided data on VTEC in bovine meat and products thereof (Table VT3). In fresh bovine meat, proportions of positive samples varied usually between 0.2-4%, although Poland and Italy reported higher figures, 8.3% and 38.2% respectively. VTEC was also detected in ready-to-eat meat preparations and meat products.

Germany reported 2.4% of raw cow milk samples were positive for VTEC. This represents a higher proportion than what was observed 2003, where 0.1% of 818 tested samples were positive (Table VT3).

Table VT3. VTEC in fresh bovine meat and cow milk, 2004. Data are only presented for sample sizes >25 with positive findings

	Bovine meat			Cow Milk		
	Description	N	% Pos	Description	N	% Po
Belgium	Fresh, at slaughter	1,319	1.4	-	-	-
	Fresh, at processing	244	0.8	-		
	Minced meat, at retail	98	1.0	-	-	-
	Meat preparation, steak tartare, at retail	109	0.9	-	-	-
Germany	Fresh, at processing	28	0	-		
	Fresh, at retail	102	2.9	Raw at farm	205	2.4
Ireland	Fresh, at processing	6,715	0.2	-	-	-
	Meat products, non ready-to-eat, at processing	309	0.3	-	-	-
Italy	Fresh, at processing	34	38.2	-	-	-
Poland	Fresh, at slaughter	144	8.3	-	-	-
Portugal	-	-	-	-	25	0.0
Slovakia	Fresh, at processing	54	0	Heat treated	203	0.0
	-	-	-	Raw	83	0.0
Spain	Meat products, at processing	25	4.0	-	-	-

Findings of VTEC were also reported in cheeses, fishery products and different types of meat. (Table VT4).

Four countries reported positive findings of VTEC in pig meat. In fresh meat the proportion of positives varied between 0.7-16%, being lower at the retail level.

In poultry meat, Spain reported 17.4% of samples (4 from 23 samples) were positive at processing. Ireland tested 28 turkey meat and meat product samples at processing and retail levels, without finding any VTEC.

Germany reported 12.6% of the 349 red meat samples positive for VTEC, while none of the 100 tested samples in Slovenia were positive. Ireland found one positive sample when testing 120 fresh sheep meat samples, while Norway found no positive among 243 samples tested. Norway also tested 33 fresh goat meat samples at slaughter, but found no positives.

VTEC positive findings in dairy products were reported by five MS. Slovakia detected one sample positive out of the 626 sheep milk cheeses analysed. Germany reported 0.3% positive samples in dairy products made from raw milk. Neither Belgium nor Sweden found VTEC from 147 and 109 samples of cheeses made from raw or thermised milk tested, respectively.

Two countries, Italy and Spain, reported VTEC findings in fishery products without specifying the products tested. Ireland and Slovakia tested 333 and 100 fruit and vegetable samples, respectively, without positive findings.

Table VT4. VTEC findings in other food, 2004. Data are only presented for sample sizes >25 with positive findings

Country	Description	Place of sampling	N	VTEC		VTEC, O157	
				Pos	% Pos	Pos	% Pos
DAIRY PRODUCTS							
Germany	Made from raw milk		303	1	0.3	-	-
Greece			359	11	3.1	-	-
Italy			1,765	9	0.5	4	0.2
Portugal			49	1	2	-	-
Slovakia	Sheep milk cheeses		626	1	0.16	-	-
FISHERY PRODUCTS							
Italy			423	13	3.1	-	-
Spain			319	22	6.9	-	-
PIG MEAT							
Ireland	Meat products	At processing plant	110	2	1.8	2	1.8
Italy	Fresh	At retail	121	1	0.8	1	0.8
Spain	Fresh	At retail	142	1	0.7	1	0.7
	Fresh	At slaughter	97	1	1	-	-
	Meat products	At processing plant	90	1	1.1	-	-
Portugal	Fresh	At processing plant	25	4	16	-	-
	Fresh	At retail	74	4	5.4	-	-
POULTRY MEAT							
Spain	Fresh	At retail	188	2	1.1	-	-
	Fresh	At slaughter	58	1	1.7	-	-
SHEEP MEAT							
Ireland	Fresh	At processing plant	120	1	0.8	1	0.8

3.4.3. VTEC in animals

Eleven MS (Austria, Belgium, Denmark, Finland, Germany, Greece, Latvia, Portugal, Poland, Sweden and The Netherlands) and Norway reported on VTEC in a number of animal species.

Several MS conducted testing for VTEC in cattle (Table VT5). For the most part, the purpose of monitoring was to detect the presence of *E. coli* O157. Samples were either collected at the slaughterhouse or at the farm. In Belgium, Finland, Norway and Sweden, targeted sampling was carried out as a follow-up of *E. coli* O157 infections in humans or findings in animals.

VTEC O157 in cattle and bovine meat in Finland

In Finland, a compulsory control programme for all bovine slaughterhouses started in January 2004. Faecal samples were collected by industry at a frequency based on the expectancy rate of 1%, accuracy of 0.5% (CI 95%). The number of samples to be collected at the different slaughterhouses was calculated based on slaughter capacity, and sampling was distributed throughout the year. VTEC O157 was detected in 20 animals from 15 farms. However, VTEC O157 could not be isolated from samples collected from six of these 15 farms.

A second project to detect the herd point-prevalence of VTEC O157 was conducted in Finland in 2004. A total of 72 conventional farms, selected as they sent animals for slaughter during a prevalence study carried out in 2003, as well as 57 organic farms, participated in this project. VTEC O157 was found in 5.7% of these farms.

The highest proportion of positive animals was observed in Germany where 24.1% of 29 dairy cows were found positive. In total, 13.6% of cattle were found positive for VTEC, two of which were positive for VTEC O177. Slightly lower proportions were reported from meat production animals in Denmark and Finland. Denmark reported 8.4% of animals tested positive for VTEC O157. Finland reported 10% of meat production herds positive from survey results.

Table VT 5. VTEC in cattle, 2004

	Remark	N	VTEC	% Pos	O157	Non-O157
Austria	Cattle at slaughter	287	7	2.4	-	-
Belgium	Animals	59	2	3.4	-	-
Denmark	Meat production, animals	251	21	8.4	-	-
Finland	At slaughter, animals	1,603	20	1.2	20	0
	Dairy cows, herds	67	1	1.5	1	0
	Meat production animals, herds	50	5	10	5	0
Germany	Animals	273	37	13.6	-	2
	Dairy cows, animals	29	7	24.1	-	-
	Calves, animals	97	0	0	-	-
Italy	Survey, animals	154	0	0	-	-
	Calves, animals	308	3	1	0	3
Portugal	Animals	241	0	0	-	-
Slovakia	Calves, animals	100	0	0	-	-
The Netherlands	Dairy cows, herds	153	13	8.5	-	-
	Veal calves, herds	171	23	13.5	-	-

VTEC was also found in animals other than cattle. Three out of 5 reporting countries reported positive finding of VTEC in pigs (see Table VT6 and in Level 3, Table VT4). Few findings of VTEC in goats and sheep were reported, however Italy detected VTEC O157 in three out of 32 goats tested.

Only four MS reported data on poultry and VTEC was not detected by three of them. However, in Italy, 11 out of 58 samples of poultry tested were VTEC positive. A monitoring programme in turkeys was also conducted Italy, and none of the 115 animals tested were found positive. Finally, Italy also tested 168 wild deer without isolating any VTEC.

Table VT 6. VTEC in other animals, 2004

	Remark	N	VTEC	% Pos	O157
PIGS					
Germany	-	209	18	8.6	-
Italy	Survey	97	0	0	-
Latvia	-	81	4	4.9	1
Portugal	-	397	22	5.5	-
Slovakia	-	135	0	0	-
POULTRY					
Italy	-	58	11	19	-
	Turkey flocks	115	0	0	-
Greece	-	58	0	0	-
Latvia	-	121	0	0	-
Portugal	-	205	0	0	-
GOATS AND SHEEP					
Austria	Goats and sheep	89	1	1.1	0
Greece	Goats and sheep	74	0	0	-
Italy	Goats	32	3	9.4	3
Italy	Goats and sheep, survey	585	0	0	-
Portugal	Goats and sheep	158	2	1.3	-
OTHER					
Italy	Deer	168	0	0	-

Small numbers of samples from pets were investigated (sample sizes ranged from 1-45) and reported by six MS. The majority of these samples were collected from dogs and the vast majority of the samples were negative.

3.4.4. Summary

The overall number of human cases reported in the EU increased in 2004 compared to 2003. The majority of the increase was reported by the Czech Republic, who contributed with 42% of the total number of cases. By comparing only those MS who reported data for both years, the total number actually decreased by 3% from 2003 to 2004. The number of cases of HUS caused by VTEC remained similar to that reported in 2003.

A total of 18 MS and Norway reported data on the occurrence of VTEC in foodstuffs. Fresh meat, milk and dairy products were the food categories most often tested, and positive findings occurred from all of them. VTEC was reported from bovine, pig, sheep and poultry meat. Two MS reported relatively high proportions of positive samples in fishery products, and the relevance of these findings to human health deserves further study.

The occurrence of VTEC in animals was mainly monitored through collection of faecal samples at slaughter. Positive finding were detected in several farm animal species: cattle, goats, sheep, and pigs. The reported prevalences varied and the data received does not permit the evaluation of differences between animal species or MS. Information on pathogenicity factors of the isolated VTEC strains was not provided.

3.4.5. Sources of VTEC data

In humans, VTEC infections are notifiable in 14 MS: Austria, Czech Republic, Denmark, Estonia, Finland, Germany, Greece, Hungary, Italy, Latvia, Lithuania, Poland, Slovenia, and The Netherlands (see Appendix, Table VT2). In Norway, notification of VTEC in humans has been mandatory since 1995. In Sweden, as of 1 July 2004, all serotype of VTEC are notifiable in humans. EHEC is notifiable in Greece. In Cyprus, EHEC will be a notifiable disease as of January 2005.

Food samples were collected in a variety of settings such as official control and monitoring programmes, random national surveys and as part of HACCP or own check programmes. The number of samples collected and types of food sampled varied among individual MS.

In animals, VTEC is notifiable in Estonia, Finland, Lithuania and Slovenia. In Sweden, VTEC O157 became notifiable in cattle in 1996, however, since 1996, findings are notifiable only when associated with human infections. In Belgium, VTEC findings will become notifiable in animals as of 2005. Samples were, for the most part, collected as faecal samples or carcass swabs at slaughter.

For further details on surveillance and monitoring, please refer to Appendix, Table VT1.

3.5. Tuberculosis due to Mycobacterium bovis

Tuberculosis is a chronic disease caused by granulomatous infections with either *Mycobacterium tuberculosis* or *M. bovis. M. avium* is also able to cause diseases in humans, especially in immunocompromised persons. Man is the natural host for *M. tuberculosis* and birds for *M. avium*. *M. bovis* causes tuberculosis in cattle, but is also highly infectious in humans, which poses a serious zoonotic risk. Tuberculosis in humans caused by *M. bovis* is clinically indistinguishable from infections caused by *M. tuberculosis*. This chapter focuses on zoonotic tuberculosis caused by *M. bovis*.

Transmission of tuberculosis from animals to humans occurs mainly through consumption of raw milk from infected cattle. It may be prevented by heat-treatment such as pasteurisation of milk and milk products. The introduction of pasteurisation and eradication programmes implemented in cattle in combination with vaccination of humans has significantly reduced human infections caused by *M. bovis*.

3.5.1. M. bovis in humans

In many MS, the notification systems do not distinguish between the different species of mycobacteria, or only a subset of the *Mycobacteria* isolates is speciated. Thus, even though tuberculosis in humans is notifiable, the reported number of human cases due to *M. bovis* can be much higher than reported here. Due to this, a Community incidence for human *M. bovis* infections was not estimated.

In 2004, the 17 MS that included data on human *M. bovis* cases reported a total of 86 cases (Table TB1). This number is much higher than reported 2001-2003, where approx. 60 cases occurred annually, mainly because German data were included in 2004.

The risk of contracting tuberculosis from domestic animals in MS that are officially free of bovine tuberculosis (OTF) is assumed to be extremely low, and none of the MS reported suspicions of contact with animals as source of infection for human cases of *M. bovis* in 2004. This was also the case in 2003.

Six MS included information on whether the tuberculosis infection was acquired domestically or abroad, and three MS reported imported cases for *M. bovis*, specifically (Table TB1). In MS where bovine tuberculosis has been eradicated, domestic cases are usually considered to be reactivations of pre-existing infections in elderly persons or immigrants, such as the single domestic case reported from Denmark in 2004.

Table TB1. Total number of human tuberculosis cases reported infected with *M. bovis*, 1999-2004. OTF status in 2004 is indicated, and numbers of imported cases are noted in brackets

	2004	2004	2003	2002	2001	2000	1999
	Cases/ 100,000 population	No. of cases: Total (Imported)					
Austria[1] (OTF)	<0.1	4	4	4	5	0	0
Belgium (OTF)	<0.1	5	5	2	2	0	0
Cyprus	0.14	1 (1)	-	-	-	-	-
Czech Republic (OTF)	-	-	-	-	-	-	-
Denmark (OTF)	<0.1	2 (1)	1	2	4	12	2
Estonia	0	0	-	-	-	-	-
Finland (OTF)	0	0	0	0	0	0	0
France (OTF)	-	-	-	-	-	-	22
Germany (OTF)	<0.1	51	-	-	-	-	64
Greece	0	0	0	0	0	93	-
Hungary	0	0	-	-	-	-	-
Ireland	<0.1	2	6	7	3	1	8
Italy[2]	<0.1	5	1	4	0	0	-
Latvia	0	0	-	-	-	-	-
Lithuania	0	0	0	-	-	-	-
Luxembourg (OTF)	-	-	-	-	-	-	-
Malta	-	-	-	-	-	-	-
Poland	-	-	-	-	-	-	-
Portugal	-	-	-	-	0	-	-
Slovakia	-	-	-	-	-	-	-
Slovenia	0	0	-	-	-	-	-
Spain[3]	<0.1		4	6	2	3	5
Sweden (OTF)	<0.1	4 (2)	5	7	5	5	2
The Netherlands (OTF)	-	-	-	8	10	13	19
United Kingdom	<0.1	8	30	20	30	21	40
EU-Total		**86**	**58**	**56**	**62**	**150**	**159**
Norway (OTF)	0	0	0	1 (1)	1 (1)	2 (2)	1 (1)

Note: Not all MS report *M. bovis* separately, or only type a subset of the isolates. Therefore even when tuberculosis is notifiable, the reported number of *M. bovis* can be much higher.

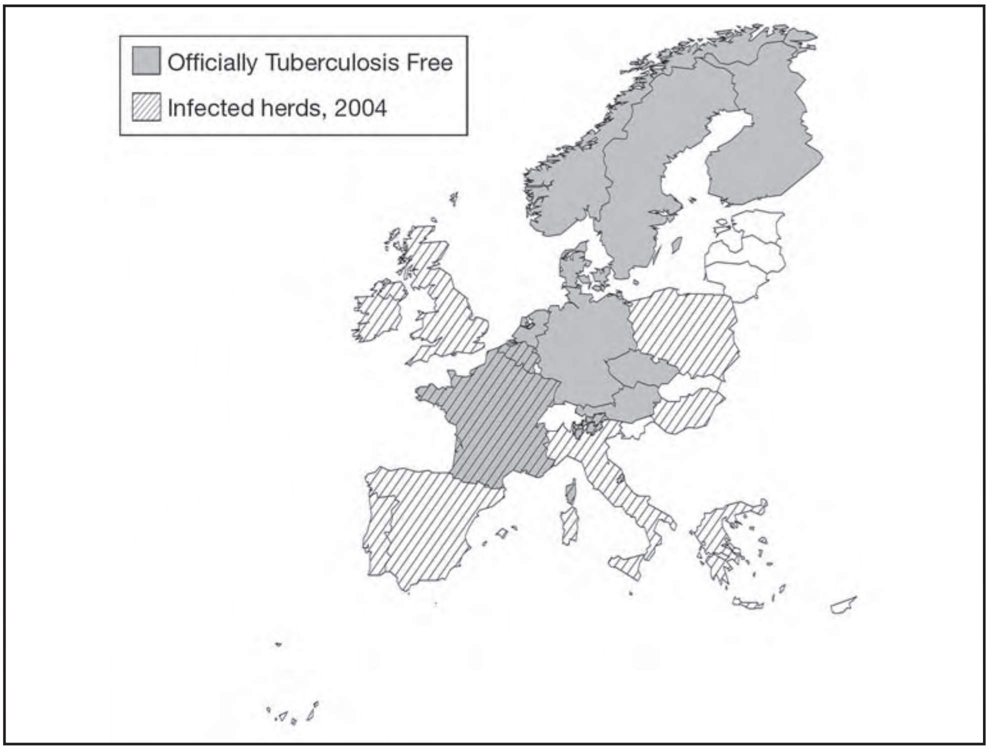
1. In Austria, *M. bovis* spp. *caprae* was isolated in 3 out of 4 cases in 2004 and 2003, in 1 out of 4 cases in 2002 and in 1 out of 5 cases in 2001.
2. In Italy, the following six provinces were OTF: Bergamo, Lecco, Sondrio, Ascoli Piceno, Bolzano and Trento.
3. In Spain, only hospitalised cases are notifiable.

3.5.2. Tuberculosis due to M. bovis in animals

Cattle

The status of bovine tuberculosis in the European Union and Norway in 2004 is presented in Figure TB1. Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Luxembourg, The Netherlands, Sweden and Norway were officially bovine tuberculosis-free in accordance with the Community legislation. Six provinces of Italy had this status, as well. All reported data are presented in Level 3, Table TB3 and TB4.

Figure TB1. Status of bovine tuberculosis in the EU and Norway, 2004



Officially Tuberculosis Free Member States (OTF)

Bovine tuberculosis was detected in cattle herds during the year in two of the 10 OTF MS, Belgium and France (Table TB2). In these two countries, together 51 herds were tuberculin test positive in 2004. In the non-MS, Norway, no infected herds or animals were reported.

Non-OTF Member States

During 2004, tuberculin test positive cattle herds were detected in eight of the 15 non-OTF MS (Table TB2). In these 15 MS, between 30-100% of the cattle herds were under official control during 2004. In total, 1.11% of the herds tested in the non-OTF MS were detected tuberculin positive in 2004 (12,625 positive out of 1,139,427 herds tested).

In Cyprus, Estonia, Latvia, Lithuania, Malta, Slovakia and Slovenia no herds tested positive during the year. These are all new MS that not yet have acquired OTF status according to EU legislation. Overall, in the new non-OTF MS, only 0.02% of the tested herds (126 out of 618,098) were tuberculin positive during the year 2004 (Table TB2). Poland and Hungary accounted for the positive herds.

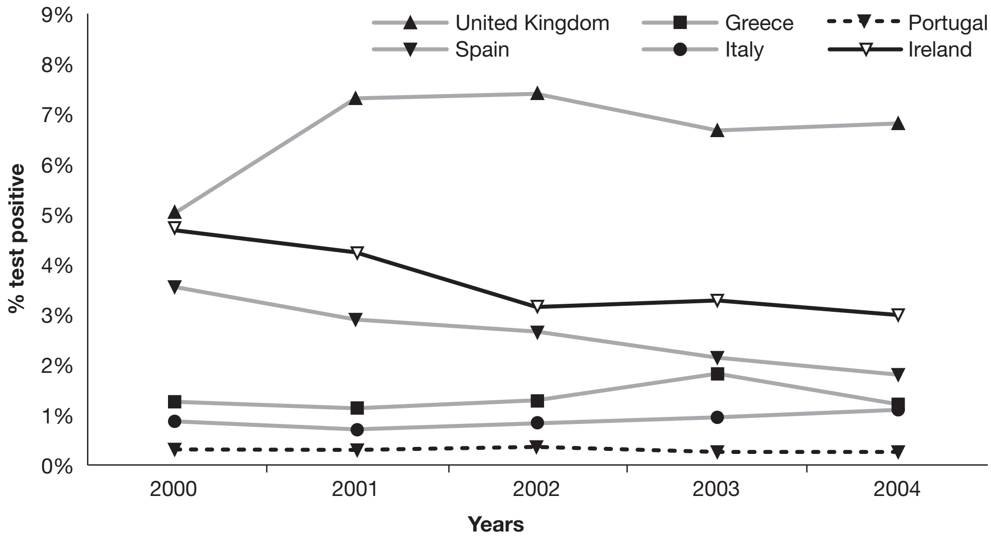
Overall, a decrease in the proportion of infected herds in most non-OTF EU-15 MS has occurred since 2001(Figures TB2 and TB3). In the non-OTF EU-15 MS, a total of 1.72% herds (12,526 out of 521,329 herds tested) were tested positive for bovine tuberculosis in 2004.

Table TB2. Notification of bovine tuberculosis and routine tuberculin testing in cattle herds in MS and Norway, 2004

	Herds		Routine testing			At year end	
	Under control	**% Under control**	**Tested**	**Herds positive**	**% positive herds**	**Infected herds**	**% OTF herds**
Cyprus	341	92	81	0	0	0	-
Estonia	6,548	70	6,548	0	0	0	-
Greece[1]	31,097	83	11,273	136	1.21	136	69
Hungary	26,218	-	26,218	1	0	1	100
Ireland	124,414	-	120,290	3,595	2.99	3,852	96
Italy[2]	187,098	101	100,508	1,110	1.10	674	62
Latvia	71,799	100	71,799	0	0	0	-
Lithuania[1]	195,226	100	195,226	0	0	0	100
Malta[1]	154	37	78	0	0	0	100
Poland	260,907	30	260,907	125	0.05	34	100
Portugal[1]	90,292	100	67,468	178	0.26	82	95
Slovakia[1]	11,355	62	10,188	0	0	0	97
Slovenia[1]	46,041	99	47,053	0	0	0	103
Spain[1]	154,610	63	151,723	2,735	1.80	2,742	96
United Kingdom	120,931	109	70,067	4,772	6.81	1,491	96
EU-10, Total non-OTF	**640,434**	**51**	**618,098**	**126**	**0.02**	**35**	
EU-15, Total non-OTF	**708,442**	**87**	**521,329**	**12,526**	**1.72**	**8,977**	
EU-25, Total non-OTF	**1,348,876**	**64**	**1,139,427**	**12,652**	**1.11**	**9,012**	
Officially tuberculosis free (OTF)							
Austria	86,034		-	-	-	0	100
Belgium	42,553		3,371	8	0.24	4	100
Czech Republic	27,806		12,829	0	0	0	100
Denmark	-		-	-	-	0	100
Finland	22,882		-	-	-	0	100
France	283,124		118,563	43	0.04	65	88.2
Germany	32,412		-	-	-	-	-
Luxembourg	2,000		0	-	-	0	100
Sweden	-		0	-	-	0	100
The Netherlands	59,524		-	-	-	0	100
EU-25 total			**12,703**				
Norway	22,500		0	-		0	100

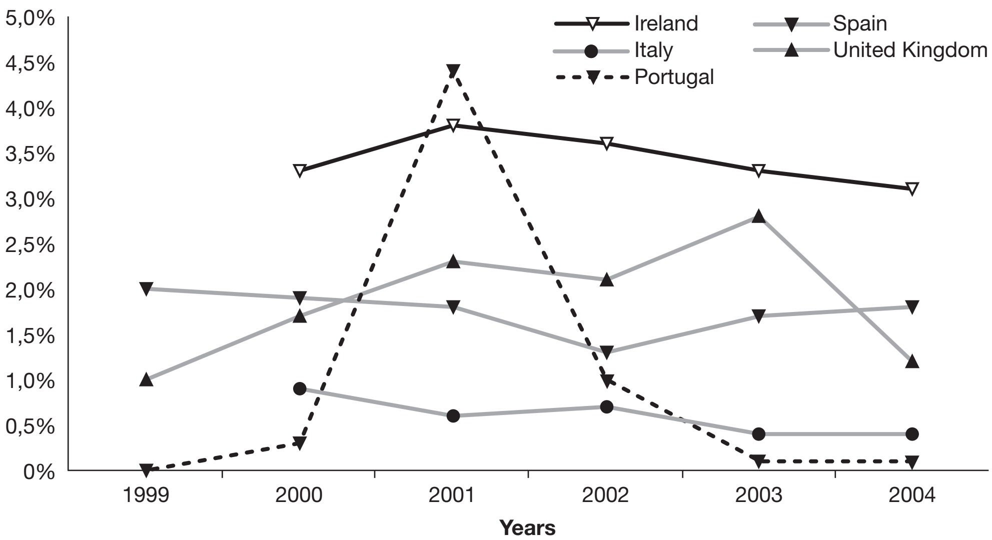
1. The % herds under control are based on the reported number of holdings, so the proportions can be overestimated. All others are based on number of reported herds.
2. In Italy, six provinces are officially tuberculosis free.

Figure TB2. Proportion of cattle herds tested tuberculin positive in routine testing during the years 2000 to 2004 in selected non-OTF Member States



Compared to 2003, the proportion of cattle herds tested positive for bovine tuberculosis during the year decreased in Spain, Greece and Ireland, remained at the same level in Portugal and slightly increased in Italy and United Kingdom (Figure TB2). However, the proportion of cattle herds infected at the year end decreased both in Italy and the United Kingdom when compared to 2003 (Figure TB3). All the non-OTF EU-15 MS perform national eradication programmes for bovine tuberculosis, most of which are co-financed by the Community.

Figure TB3. Proportion of cattle herds infected with *M. bovis* at the end of year 1999 to 2004 in selected non-OTF Member States.



Note: For the United Kingdom, year 2000 and 2004 only include data from Great Britain.

Tuberculosis due to M. bovis in other animals

Surveillance of tuberculosis in sheep and goats is performed mostly by post mortem meat inspection. In addition, results from other bacteriological investigations are sometimes reported. Findings of *M. bovis* are notifiable in Finland, Ireland, Sweden and Norway. In 2004, *M. bovis* was detected in sheep in United Kingdom, and in goats in Portugal and Spain. Previously *M. bovis* in sheep or goats was also reported from France 2002, Ireland (1999 and 2000), Portugal (1999, 2002, 2003), Spain (2000 and 2001) and United Kingdom (2001 and 2002).

Surveillance of tuberculosis in pigs is performed mostly by post mortem meat inspection. Findings of *M. bovis* in pigs are notifiable in Denmark, Finland, Sweden and Norway. In 2004, *M. bovis* in pigs was only detected in United Kingdom, which was also the case in 2002 and 2003.

Surveillance of tuberculosis in farmed deer is also performed mostly by post mortem meat inspection, but in some MS also by intradermal tuberculin tests in herds. *M. bovis* is notifiable in farmed deer in Denmark, Finland, Ireland, Sweden, Norway and Great Britain. As in the previous years, no positive findings were reported from farmed deer (herds/animals) during 2004.

With the exception of Finland, Sweden and Norway, tuberculosis in wildlife is not notifiable in the MS. In wildlife populations, *M. bovis* was reported in deer (Spain and United Kingdom), in wild boars (Spain) and badgers (United Kingdom) in 2004. This occurrence is comparable to numbers reported for previous years.

All reported data from farmed deer are presented in Level 3, Table TB5, and from other animals in Level 3, Table TB6 and TB7.

3.5.3. Summary on M. bovis

In 2004, the total number of human cases (86) was much higher than in 2001-2003 (approx. 60 cases annually). This increase was mainly due to the inclusion of German data in 2004. The notification systems in most MS do not distinguish between the different types of *Mycobacteria*, or only a subset of the isolates are speciated, so a Community incidence for human *M. bovis* infections and an overall trend cannot be estimated.

The risk of humans contracting tuberculosis from domestic animals in the OTF MS and the new MS is assumed to be extremely low. In these MS, domestic cases in humans are usually considered to be reactivation of pre-existing infections in elderly or immunosuppressed persons or infections in immigrants.

The occurrence of bovine tuberculosis among cattle herds in the non-OTF EU-25 MS generally decreased or showed an insignificant increase. Most of the new MS do not yet have OTF status according to the EU legislation, but the proportion of cattle herds that tested positive in tuberculin test, was relatively low in these MS compared to the old non-OTF MS.

3.5.4. Sources of tuberculosis data

Tuberculosis in humans is notifiable in 22 MS and Norway. Luxembourg, Malta and Poland provided no information on their notification systems. In several of the reporting MS, the notification system for human tuberculosis does not distinguish the tuberculosis cases caused by different species of *Mycobacterium* (Appendix Table TB1).

Rules for intra-Community trade on bovine animals including requirements for cattle herds and countries qualification as officially free from tuberculosis are laid down in Council Directive 64/432/EEC as last, amended by Regulation (EC) 1226/2002.

Community co-financing of programmes for eradication of bovine tuberculosis in 2004 were approved for Greece, Spain, Ireland, Italy, Lithuania, Poland, Portugal, Slovenia and United Kingdom (Commission Decision 2003/849/EC).

The non-MS, Norway, is Officially Tuberculosis Free, and monitors *M. bovis* according to the EU directives. An overview of the OTF status is presented in Appendix Table TB-BR1.

3.6. Brucella

Brucellosis is an infectious disease caused by some bacterial species of the genus *Brucella*. There are four species known to cause human disease and each of these has a specific animal reservoir: *B. abortus* in cattle, *B. canis* in dogs, *B. melitensis* in goats and sheep and *B. suis* in pigs. Transmission occurs through contact with animals, or animal tissue contaminated with the organisms, or through ingestion of contaminated products.

In humans, brucellosis is characterised by flu-like symptoms such as fever, headache, and weakness of variable duration. However, severe infections of the central nervous systems or endocarditis may occur. Brucellosis can also cause long-lasting or chronic symptoms that include recurrent fever, joint pain and fatigue. Of the four species known to cause disease in humans, *B. melitensis* is the most virulent and causes the most severe illness.

In animals, the organisms are localised in the reproductive organs causing sterility and abortions, and are shed in large numbers in the animal's urine, milk and placental fluid.

3.6.1. Brucellosis in humans

In 2004, a total of 1,337 cases of human brucellosis were reported from 21 MS (Table BR1), resulting in a Community incidence (EU-25) of 0.4 cases per 100,000 population. No data were provided from Luxembourg, Malta and Slovakia.

Overall, the human incidence of brucellosis in the old MS has decreased since 1999 (Figure BR1). From 1999 to 2004 the incidence among non-OBF (non-Officially Brucellosis Free) EU-15 MS decreased from 1.6 in 1999 to 0.5 in 2004. The level of reported human brucellosis in the new non-OBF MS was relatively low (>0.1) in 2004 compared to the level in the old non-OBF MS.

The risk of contracting brucellosis from animals in the OBF MS is assumed to be extremely low, and none of these MS reported occupational cases in 2004. The risk was also low in non-OBF MS where few occupational cases were reported in Cyprus (1), France (1), Poland (6), Portugal (1) and Northern Ireland (5). Six MS and Norway reported a number of cases to be acquired abroad (Table BR1).

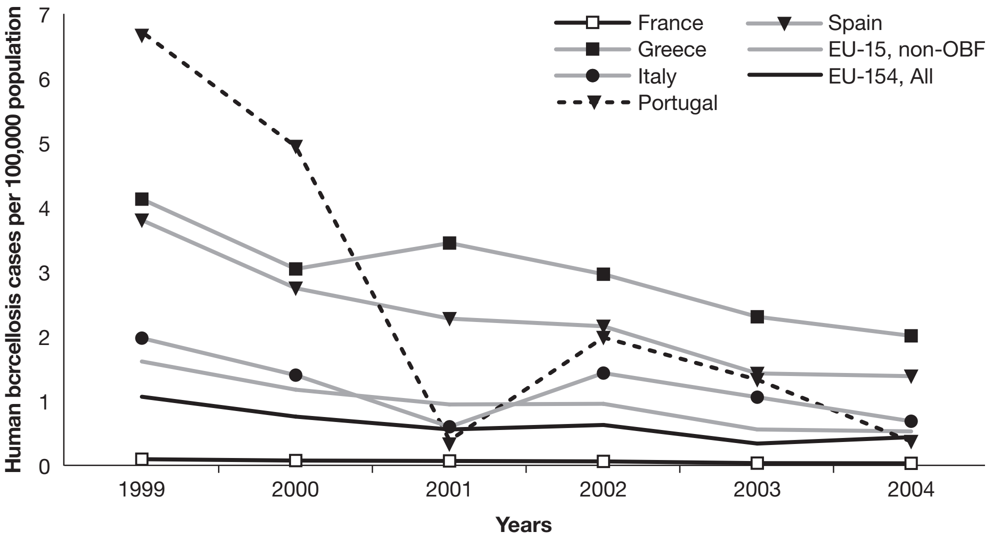
Table BR1. Reported cases of brucellosis in humans, 1999-2004, and incidences in 2004[1]. OBF and ObmF[2] status in 2004 is indicated.

	2004	2004	2003	2002	2001	2000	1999
	Cases/ 100,000 population	No. of cases: Total (imported)					
Austria (OBF/ObmF)	<0.1	2 (1)	5 (5)	4	2 (2)	2 (2)	2
Belgium (OBF/ObmF)	<0.1	8 (2)	0	1	1	0	-
Cyprus	0.3	2	-	-	-	-	-
Czech Republic (OBF/ObmF)	0	0	-	-	-	-	-
Denmark (OBF/ObmF)[3]	<0.1	4	14	16	18	1	1
Estonia	0	0	-	-	-	-	-
Finland (OBF/ObmF)	<0.1	1 (1)	1 (1)	0	1 (1)	0	0
France[4]	<0.1	19 (16)	21	37	-	44	31
Germany (OBF/ObmF)	-	-	27 (8)	35 (16)	25 (12)	27 (15)	21 (15)
Greece	2.0	223	255 (3)	327 (2)	379	334	451
Hungary (ObmF)	0	0	-	-	-	-	-
Ireland (ObmF)	<0.1	2[9]	5	4	14	15	19
Italy[5]	0.7	398	-	820	343	801	1129
Latvia	0	0	-	-	-	-	-
Lithuania	<0.1	1	0	-	-	-	-
Poland	<0.1	7	-	-	-	-	-
Portugal[6]	0.4	39	139	206	40	507	686
Slovenia	0	0	1	-	-	-	-
Spain[7]	1.4	589	596	886	924	1.104	1.519
Sweden (OBF/ObmF)	<0.1	3 (3)	3 (3)	5 (5)	2 (2)	1 (1)	0
The Netherlands (OBF/ObmF)	<0.1	8	4	5 (4)	1 (1)	3 (3)	1
United Kingdom (ObmF)[8]	<0.1	31 (19)	21 (1)	37	27	19(5)	15
EU-Total	**0.4**	**1,337 (42)**	**1,092 (21)**	**2,386 (27)**	**1,777 (18)**	**2,858 (26)**	**3,900 (15)**
Norway (OBF/ObmF)	<0.1	2 (1)	3 (2)	3 (3)	2 (2)	1 (1)	1 (1)

Note: No data from Luxembourg (OBF/ObmF), Malta and Slovakia (ObmF).
1. EU-Total incidence is based on population in reporting countries.
2. ObmF: Officially B. melitensis Free.
3. In Denmark, the disease not notifiable in humans.
4. In France, 64 départements are ObmF.
5. In Italy, 22 provinces are OBF and 20 provinces are ObmF.
6. In Portugal, Azores are OBF/ObmF.
7. In Spain, Canaries are ObmF. Only hospitalised cases notifiable.
8. In United Kingdom, Great Britain is OBF, Great Britain and Northern Ireland are ObmF. All domestic cases in 2004 were reported from Northern Ireland.
9. Only confirmed cases. In 2004, Ireland reported additionally 1 unspecified and 57 probable cases.

The highest incidences of human brucellosis in 2004 were recorded in Greece, Italy, Portugal and Spain (Table BR1), primarily caused by *B. melitensis*. The incidence of human brucellosis has reduced in these MS during the last five years, where brucellosis eradication programmes among cattle, sheep and goat populations have been ongoing (Figure BR1). Similarly, a reduction in the human incidence from 1999 to 2004 in France (from 0.1 to 0.03) and Ireland (from 0.5 to 0.05) occurred parallel with implementation of specific eradication programmes in France (caprine and ovine brucellosis) and Ireland (bovine brucellosis).

Figure BR1. Incidence of human brucellosis in selected MS that were non-OBF in 2004. Estimated EU-15 incidence in non-OBF MS and in all EU-15 MS was based on data from MS reporting the actual years (see Table BR1)



All reported data on brucellosis in humans (2004) are presented in Level 3, Table BR1 and BR2.

3.6.2. Brucella in food

Milk, cheese and dairy products were tested for the presence of *Brucella* in a few MS (Table BR2). Most samples were of raw milk, and *Brucella* was only detected in Italy.

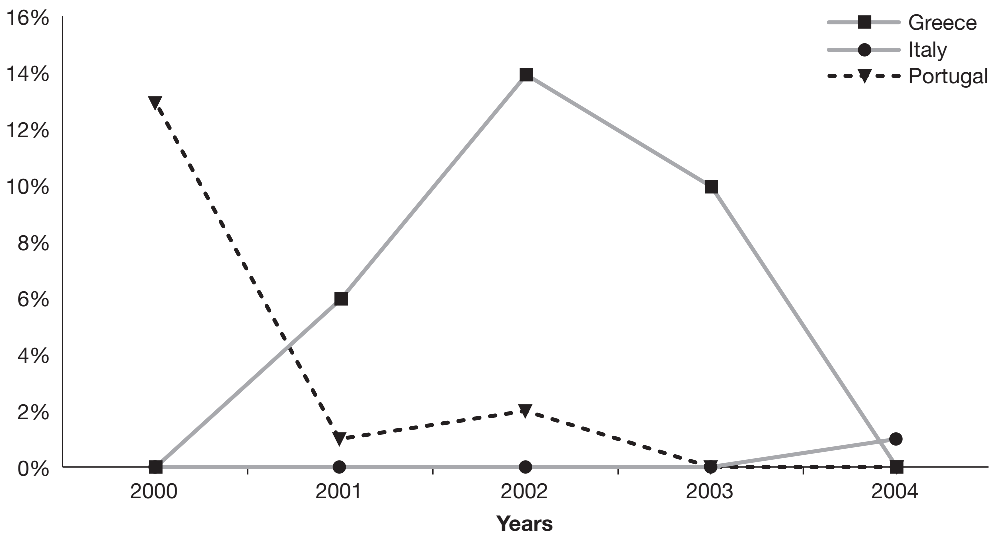
Since 2000, *Brucella* in raw cow milk has only been reported by Greece, Italy and Portugal. In Greece and Portugal the occurrence has decreased since 2002, whereas a slight increase in proportion of positive samples occurred in Italy in 2004 (Figure BR2). See Level 3, Table BR3 for more information.

Table BR2. Number of food samples tested for *Brucella* in 2004. The number of *Brucella* positive samples in brackets

		Belgium	Germany	Greece	Italy	Portugal	Poland
Cow milk	For manufacture	-	-	-	167 (0)	-	-
	Raw	14,270 (0)	24 (0)	231 (0)	586 (7)[1]	10 (0)	36,159 (0)
	Heat-treated	-	-	-	35 (0)	-	-
Other	Soft and semi soft cheeses	-	-	-		5 (0)	-
	Dairy products	-	-	-	409 (0)	-	-

1. In Italy, *B. melitensis*: 6 samples and *B. abortus*: 1 sample.

Figure BR2. Proportion of *Brucella*-positive raw milk samples, 2000 to 2004

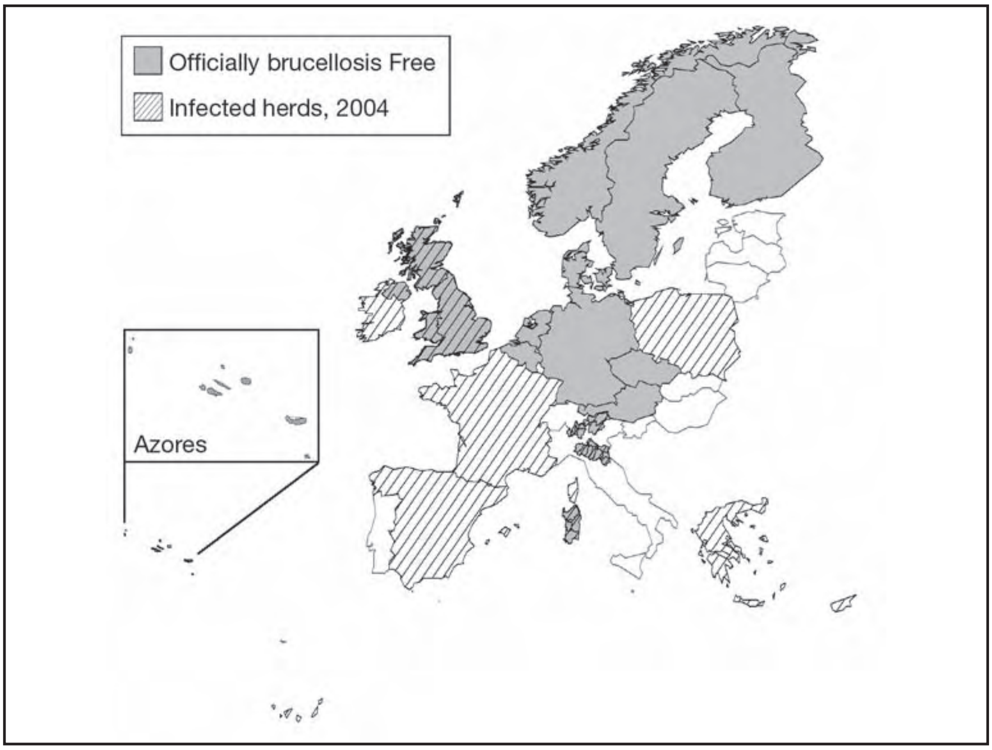


3.6.3. Brucella in animals

Cattle

The status of bovine brucellosis in the EU and Norway in 2004 is presented in Figure BR3. Austria, Belgium, Czech Republic, Denmark, Finland, Germany, Luxembourg, The Netherlands, Sweden and Norway were officially bovine brucellosis-free in accordance with the Community legislation. Several provinces of Italy, region of Azores of Portugal and Great Britain had this status, as well. See Level 3, Table BR4 and BR5 for more information.

Figure BR3. Status of bovine brucellosis in the EU and Norway, 2004



OBF Member States

During 2004, bovine brucellosis was not detected in the nine OBF MS or Norway, but only in the OBF region of Great Britain where one infected herd was detected. No OBF-MS had infected herds at the end of the year.

Non-OBF Member States

In the 16 non-OBF MS, 25-100% of the cattle herds were controlled during 2004. Brucellosis in cattle was detected in eight of these MS during 2004. Italy tested cattle herds in 22 provinces. In nine provinces no bovine brucellosis was detected and one other province 11 herds were found positive in routine testing, but all herds were OBF at the end of the year. In total, 0.51% of the herds tested in the non-OBF MS were detected bovine brucellosis positive in 2004 (5,551 positive out of 1,083,250 herds tested).

No herds were tested positive during the year in the non-OBF MS Estonia, France, Hungary, Latvia, Malta, Slovakia and Slovenia (Table BR3). Lithuania did not provide information on testing. Of these, the seven new MS do not have the OBF status according to the EU legislation, but are either free according to OIE standards or report that no herds have been found infected since the 1960s. Overall, in the new non-OBF MS, only 0.01% of the tested herds (19 out of 341,133 herds) were found infected with bovine brucellosis during the year 2004. These herds were detected in Cyprus and Poland.

In the non-OBF EU-15 MS, a total of 0.75% herds (5,532 out of 742,117 herds tested) were positive for bovine brucellosis in 2004. Overall, there is no clear trend in the proportion of infected herds in these non-OBF EU-15 MS for the last 3 years. The proportion of herds tested positive for brucellosis decreased in 2004, compared to 2003, in Northern Ireland, but increased slightly or remained at the same level in Spain, Greece, Ireland, Italy and Portugal. However, the proportion of infected herds at the year end decreased clearly in Portugal, and slightly in Ireland and Greece (Figures BR4 and BR5).

All the non-OBF EU-15 MS implement eradication programmes to control and eventually eradicate bovine brucellosis in their country. In Greece, Italy and Spain vaccination was implemented in high-risk areas.

Table BR3. Notification of bovine brucellosis and results of routine testing of cattle herds in MS and Norway, 2004

	Herds		Routine Testing			At year end	
	Under control	% Under control	Tested	Herds positive	% Positive	Herds Infected	% OBF herds
Cyprus	345	93	345	7	2.03	6	48
Estonia	2,343	25	2,343	0	0	0	0
France	283,124	100	271,645	0	0	1	99
Greece	27,224	73	10,503	440	4.19	277	82
Hungary	26,218	100	4,447	0	0	0	100
Ireland	124,583	-	124,583	283	0.23	102	100
Italy[1]	163,089	88	91,392	1,630	1.78	1,630	51
Latvia	18,643	26	18,643	0	0	0	0
Lithuania	195,226	100	-	-	-	0	100
Malta	420	100	284	0	0	0	100
Poland	283,823	32	258,937	12	0	3	100
Portugal[2]	90,292	100	71,594	701	0.98	617	79
Slovakia	11,355	62	10,188	0	0	0	97
Slovenia	46,041	99	45,946	0	0	0	103
Spain	154,248	62	151,409	2,330	1.54	2,330	92
UK-Northern Ireland	27,766	100	20,991	148	0.71	68	100
EU-10, Total non-OBF	**584,414**	**100**	**341,133**	**19**	**0.01**	**9**	
EU-15, Total non-OBF	**870,326**	**71**	**742,117**	**5,532**	**0.75**	**5,025**	
EU-25, Total non-OBF	**1,454,740**	**83**	**1,083,250**	**5,551**	**0.51**	**5,034**	
Officially brucellosis free (OBF)							
Austria	86,034		17,015	0	0	0	100
Belgium	42,553		22,762	0	0	0	100
Czech Republic	27,806		25,636	0	0	0	100
Denmark	848		-	-	-	0	100
Finland	22,882		3,036	0	0	0	100
Germany	-		10,546	0	0		-
Luxemburg	2,000		977	0	0	0	100
Sweden	27,905		1,915	0	0	0	100
The Netherlands	59,524		7,729	0	0	0	100
UK-Great Britain	114,766		55,327	0	0	0	100
EU-25 total				**5,551**			
Norway (OBF)	22,500		3,138	0	0	0	100

1. In Italy, 22 provinces are OBF.
2. In Portugal, the Azores are OBF.

Figure BR4. Proportion of cattle herds tested positive for *Brucella* in years 2002 to 2004 in selected non-OBF EU-15 MS

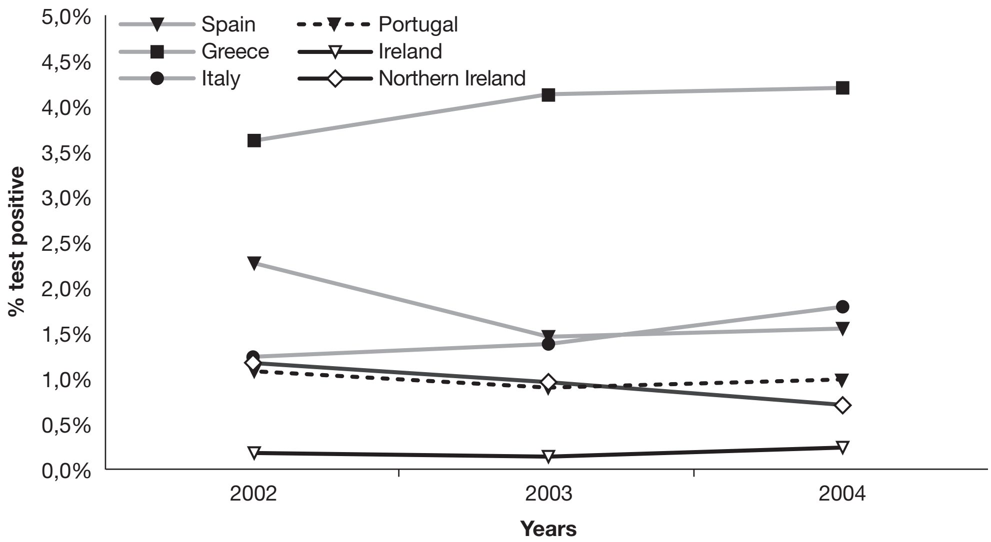
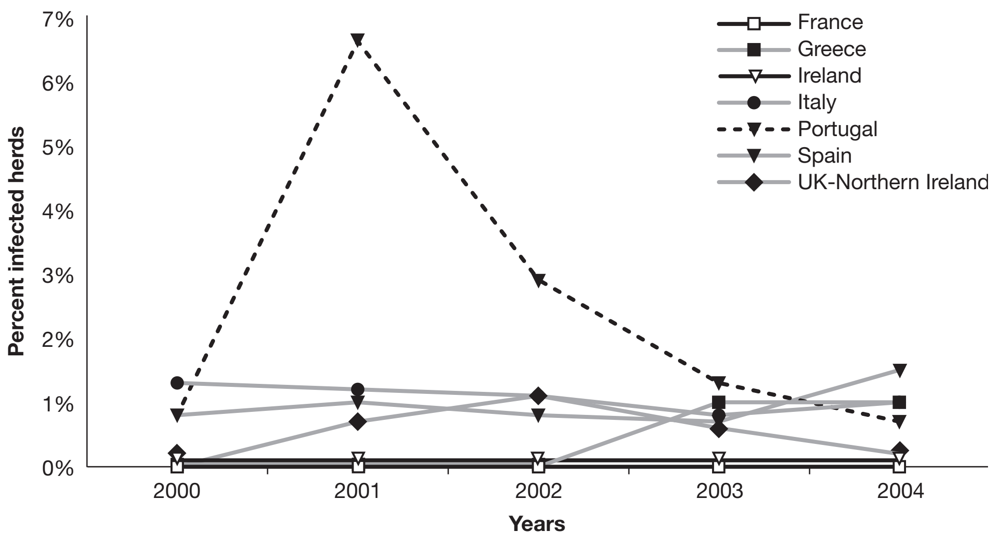


Figure BR5. Proportion of cattle herds infected with *Brucella* at the end of year 2000 to 2004 in selected non-OBF EU-15 MS



Sheep and goats

The status of ovine and caprine brucellosis *(B. melitensis)* in the EU and Norway in 2004 is presented in Figure BR6. Austria, Belgium, Czech Republic, Denmark, Germany, Luxembourg, The Netherlands, Slovakia, Finland, Ireland, Hungary, Sweden, the United Kingdom and Norway are officially ovine and caprine brucellosis-free in accordance with the Community legislation. Several provinces of Italy and France, the Canaries of Spain as well as region of Azores of Portugal have this status, as well. See Level 3, Table BR6 and BR7 for more information.

Figure BR6. Status of ovine and caprine brucellosis (*B. melitensis*) in the European Union and Norway, 2004

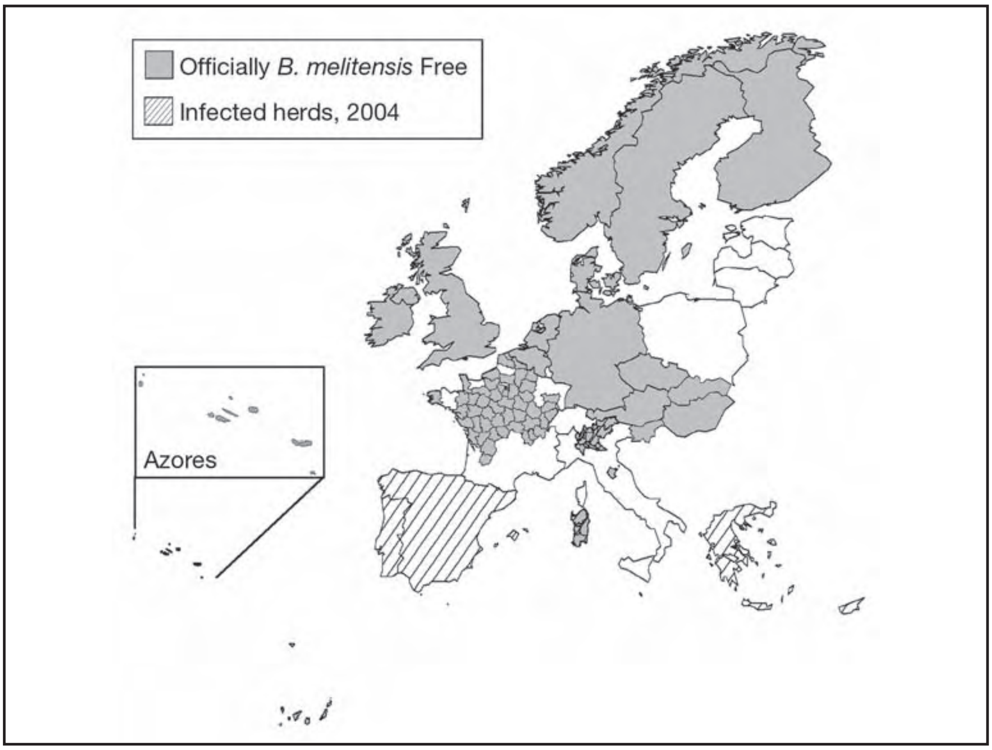


Table BR4. Notification of ovine and caprine brucellosis and results of routine testing of sheep and goat herds in MS and Norway, 2004

	Herds		Routine testing			At year end	
	Under control	% Under control[1]	Tested	Positive Herds	% Positive Herds	Herds infected	% OBF herds
Cyprus	4,059	97	4,059	30	0.74	21	41
Estonia	58	3	66	0	0	0	-
France[4]	93,233	76	-	0	-	0	76
Greece	126,160	145	657	37	5.63	40	4
Italy[1]	82,998	69	69,955	2,411	3.45	2,411	78
Latvia	-	-	-	-	-	-	-
Lithuania	6,850	109	750	0	-	0	100
Malta	2,109	57	1,636	0	0	0	100
Poland	3,406	25	1,739	0	0	0	74
Portugal[2]	70,977	100	65,907	1,767	2.68	1,034	78
Slovenia	5,281	57	529	0	0	0	-
Spain[3]	127,150	56	120,422	6,171	5.12	4,220	49
EU-10, Total non-ObmF	**21,763**	**55**	**8,779**	**30**	**0.34**	**21**	
EU-15, Total non-ObmF	**500,518**	**80**	**256,941**	**10,386**	**4.04**	**7,705**	
EU-25, Total non-ObmF	**522,281**	**78**	**265,720**	**10,416**	**3.92**	**7,726**	
Officially brucellosis free (ObmF)							
Austria	77,809		1,625	0	0		100
Belgium	45,141		-	-	-		100
Czech Republic	4,559		2,243	0	0		100
Denmark	650		-	-	0		100
Finland	2,766		-	-	0		100
Germany	1,268		-	-	0		100
Hungary	18,613		2,719	0	0		100
Ireland	43,000		1,400	0	0		100
Luxembourg	-		-	-	-		-
Slovakia	2,553		1,455	0	0		100
Sweden	7,639		-	0	0		100
The Netherlands	18,007		1,700	0	0		100
United Kingdom	288,869		7,271	0	0		100
EU-25 total				**10,416**			
Norway (ObmF)			1,655	0			

1. In Italy, 22 provinces are OBF.
2. In Portugal, the Azores are OBF.
3. In Spain, the Canaries are ObmF.
4. In France 64 départements are ObmF.

Officially B. melitensis Free (ObmF) Member States

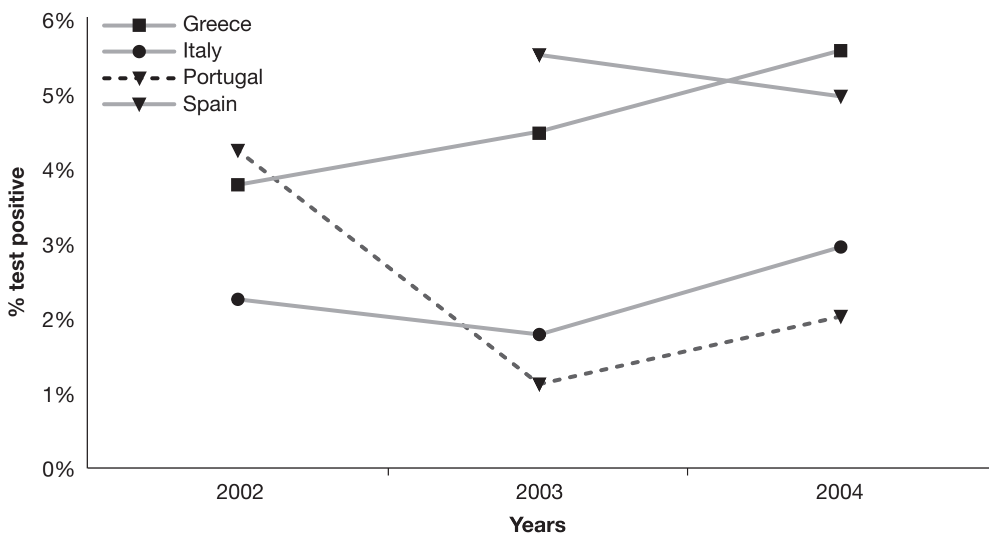
In 2004, *B. melitensis* was not detected in sheep and goat herds in the 13 MS, French départements or Norway with ObmF status. Infection was detected in ObmF regions in Italy, Portugal (Azores) and Spain (Canaries).

Non-ObmF Member States

Brucellosis in sheep and goat herds was detected in 5 of the 12 non-ObmF MS during 2004 (Cyprus, Greece, Italy, Portugal and Spain) (Table BR4). In Estonia, France, Lithuania, Malta, Poland and Slovenia no infected herds were reported during year 2004. Latvia did not provide information on testing. In most MS, at least half of the herds were under control, but in Estonia and Poland only 3% and 25%, respectively, were controlled during 2004. In total, 3.92% of the herds tested in the non-ObmF MS were detected positive for *B. melitensis* in 2004 (10,416 positive out of 265,720 herds tested).

Of the new MS that have not ObmF status according to the EU legislation, *B. melitensis* has never been detected in Latvia and Lithuania. Slovenia is free according to OIE standards and Estonia report that no herds have been found infected since the 1960s. Of the new MS, *B melitensis* was only detected in sheep and goats in Cyprus during 2004.

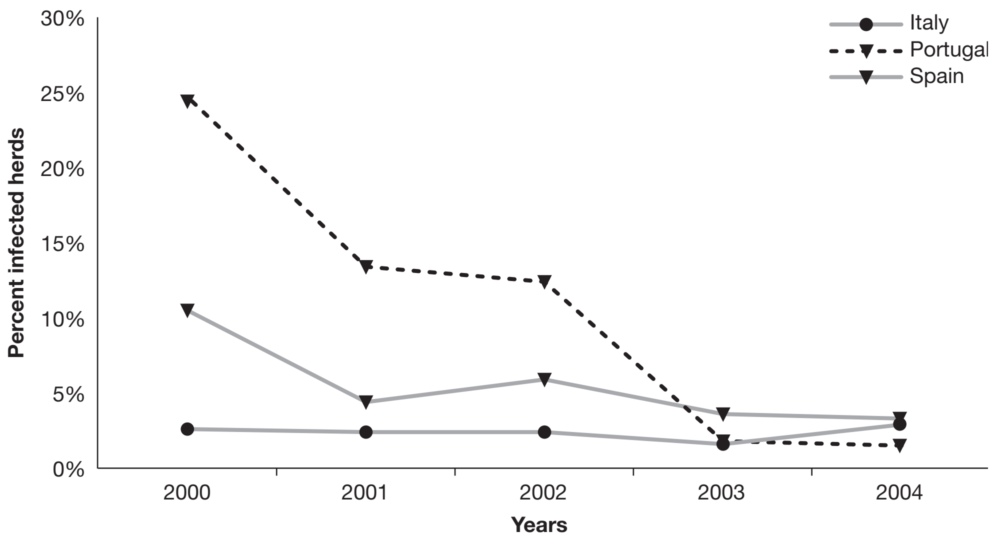
Figure BR7. Proportion of sheep and goat herds tested positive for *Brucella melitensis* during the years 2002 to 2004 in selected non-ObmF EU-15 MS



In the non-ObmF EU-15 MS, a total of 4.04% herds (10,386 out of 256,941 herds tested) were positive for *B. melitensis* in 2004. Overall, the proportion of infected herds at year end has decreased in most of the countries since 2000. However, the proportion of herds tested positive in 2004 increased in Greece, Italy and Portugal when compared to 2003. In Spain the proportion of the herds tested positive decreased during the same period (Figures BR7 and BR8).

All the non-ObmF EU-15 MS implement eradication programmes to control and eradicate ovine and caprine brucellosis in their country. In Greece, Italy, Portugal and Spain vaccination was implemented in high-risk areas.

Figure BR8. Proportion of sheep and goat herds infected with *Brucella* at the end of year 1999 to 2004 in selected non-ObmF EU-15 MS[1]



1. Less than 0.1% of the herds under control in France and Greece were infected at the end of the year from 2000 to 2004.

Pigs and other animals

Porcine brucellosis is a relatively rare disease in the EU Community. Seventeen MS and Norway reported testing of pigs, and *B. suis* was bacteriologically verified in Austria and Hungary. In previous years, *B. suis* was detected in pigs in Austria (2002, 2003), Denmark (1999), France (2002), Portugal (1999-2003) and Spain (2000-2003).

Wildlife was tested for Brucella in Belgium, Italy, Latvia, Spain and Sweden. In Belgium, *B. suis* was detected in a wild boar. In Italy, a research project found *Brucella* (primarily *B. suis*) in 5% of the tested wildlife, and surveillance of 3661 game animals in Spain found *Brucella* (primarily *B. abortus* and *B. melitensis*) in 5% of game animals (primarily in deer and wild boars). *Brucella* was not detected in the wildlife tested in the other MS. See Level 3, Table BR8 for more information.

3.6.4. Summary on Brucella

The Community incidence of human brucellosis (EU-25) in 2004 was 0.4 cases per 100,000 population. Overall, human incidence of brucellosis in the EU-15 MS decreased from 1999 to 2003, and remained at the same level in 2004. During recent years, the highest incidences of human brucellosis have been recorded in Greece, Italy, Portugal and Spain; cases have primarily been caused by *B. melitensis*. Over the last five years, implementation of brucellosis eradication programmes took place resulting in a reduction of human brucellosis in the majority of these MS.

No clear general trends were detectable in bovine or caprine and ovine brucellosis in the non-free Member States. The overall occurrence of brucellosis among cattle, sheep and goat herds in the EU-15 MS remained approximately at the same level as in 2003.

Most of the new MS had not yet obtained the OBF/ObmF status according to the EU legislation in 2004, however brucellosis has been eradicated or has never been observed in many of these MS.

3.6.5. Sources of Brucella data

Brucellosis in humans is notifiable in most MS except Denmark and Norway (Appendix Table BR1). Information on notification was not provided by Luxembourg and Malta.

Legislation on intra-community trade on bovine animals and swine (including qualification of herds) is laid down in Council Directive 64/432/EEC as last amended by Commission Regulation 2002/1226 and for sheep and goats in Council Directive 91/68/EEC as last amended by 2003/708/EC.

By the end of 2004, 9 MS: Austria, Belgium, Czech Republic, Denmark, Finland, Germany, Luxembourg, Sweden and The Netherlands as well as 22 provinces in Italy, the Azores in Portugal and Great Britain in the United Kingdom were officially free of brucellosis in cattle (OBF), sheep and goat (ObmF). Hungary, Ireland, Slovakia and the rest of the United Kingdom as well as 64 départements in France and the Canaries in Spain were only ObmF in 2004. Two provinces in Italy were only OBF. (Appendix Table TB-BR1).

In March 2004, the Czech Republic obtained OBF and ObmF status, and Hungary and Slovakia obtained ObmF status (Commission Decision 2004/320/EC).

Community co-financing of programmes for eradication of bovine, ovine and caprine brucellosis were approved for Cyprus, Greece, Italy, Lithuania, Portugal, Slovenia and Spain. Eradication programmes were approved for ovine and caprine brucellosis in France, and bovine brucellosis in Ireland, Poland and United Kingdom (Commission Decision 2003/849/EC).

The non-MS, Norway, has been declared OBF and ObmF, and monitor brucellosis in cattle, sheep and goat according to the EU directives.

3.7. Yersinia

The genus *Yersinia* comprises three main species causing human infections: Y*ersinia enterocolitica*, *Yersinia pseudotuberculosis* and *Yersinia pestis* (plague). The last major human outbreak of plague in Europe was in 1720. The following description deals only with *Yersinia enterocolitica* and *Yersinia pseudotuberculosis* infections.

Yersiniosis affects mainly young children, and symptoms are dominated by diarrhoea, which is often bloody. Symptoms typically develop four to seven days after exposure and may last one to three weeks or longer. In older children and adults, right-sided abdominal pain and fever may be the predominant symptoms, and may be confused with appendicitis. In a small proportion of cases, complications such as skin rash, joint pains, or spread of bacteria to the bloodstream can occur.

Infection is most often acquired by eating contaminated food, particularly raw or undercooked pig meat. The ability of this organism to grow at 4°C makes refrigerated food with a relatively long shelf life an important source of infections. Drinking contaminated unpasteurised milk or untreated water can also transmit the infection. On rare occasions, transmission may also occur by direct contact with infected animals or humans.

Clinical disease is uncommon in animals. However, dogs and farm animals, in particular pigs and cattle are known reservoirs of *Yersinia*.

3.7.1. Yersiniosis in humans

Twenty MS reported a total of 10,381 cases of human yersiniosis in 2004 compared to 10,086 cases reported from 18 MS in 2003 (Table YE1). In 2004, two thirds of cases were reported from Germany. The overall EU-25 incidence (cases per 100,000 population) for the 20 MS reporting cases in 2004 was 2.7, covering large variations between MS (Table YE1). The highest incidences were observed in the Northern part of Europe (Lithuania, Finland, Sweden, Germany, Czech Republic, Belgium and Denmark). The incidence was higher in MS with a notification system (4.9) than in MS without a notification system (0.3). A smaller difference was observed between the incidences in the old MS (EU-15: 3.0) and the new MS (EU-10: 1.7).

Of the 10,288 speciated *Yersinia* isolates, *Y. enterocolitica* was cultured from 98.5% of human cases samples and 1.3% of the cases were *Y. pseudotuberculosis*. Ten MS provided information on *Y. enterocolitica* serotype distribution. Serotype O:3 was by far the most predominant serotype in 2004 comprising 93.5% of the isolates (ranging from 70-100%). The remaining *Y. enterocolitica* isolates from 6 MS were serotype O:9.

Y. pseudotuberculosis

In 2004, 136 cases of *Y. pseudotuberculosis* were reported from four MS. Of these 131 were reported from Finland, four from Lithuania and one from Austria. Since 1998, Finland has experienced large outbreaks of *Y. pseudotuberculosis* on an almost annual basis and three of these have been traced back to domestic fresh products, iceberg lettuce and carrots.

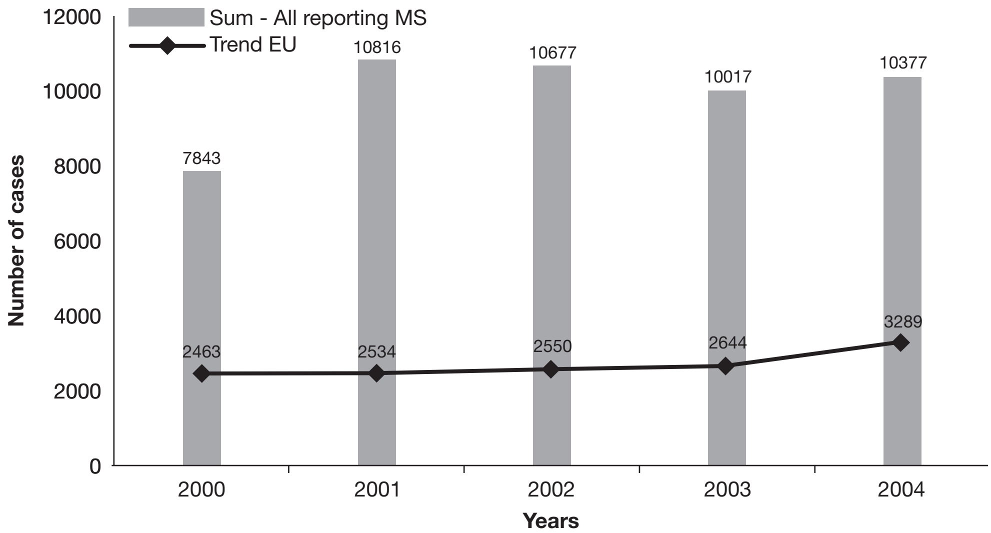
Table YE1. Reported cases if yersiniosis in humans, 2000-2004, and incidence in 2004[1]

	2004	2004		2003	2002	2001	2000
	Cases/ 100, 000 population	No. of cases	No. of cases[2]	No. of cases			
Austria	1.4	110	109	58	58	116	119
Belgium	4.8	494	494	338	330	375	485
Cyprus	-	-	-	-	-	-	-
Czech Republic	4.9	498	498	372	403	301	231
Denmark	4.2	227	227	243	240	286	265
Estonia	1.1	15	15	31	20	50	59
Finland	13.1	686	550	646	695	728	641
France	<0.1	249	249	218	-	391	-
Germany	7.5	6,182	6,182	6,571	7,515	7,186	4,778
Greece	0.4	39	37	1	-	48	-
Hungary	0.7	68	63	-	-	-	-
Ireland	0.1	6	0	6	12	3	14
Italy	0	0	0	0	2	-	-
Latvia	1.1	25	22	28	63	91	64
Lithuania	13.6	470	466	273	214	209	168
Luxembourg	-	-	-	-	-	11	-
Malta	-	-	-	-	-	-	-
Poland	0.2	84	0	-	-	-	-
Portugal	<0.1	3	3	6	-	1	-
Slovakia	1.4	78	78	-	-	-	-
Slovenia	1.9	38	38	69	74	52	49
Spain[3]	0.5	231	231	417	528	526	463
Sweden	9.0	804	804	714	610	519	554
The Netherlands	-	-	-	-	-	-	-
United Kingdom	0.1	74	68	95	43	48	59
EU-total	**2.4**	**10,381**	**10,134**	**10,086**	**10,807**	**10,941**	**7,949**
Norway	2.2	101	96	86	107	123	140

1. EU-Total incidence is based on population in reporting countries.
2. Verified as *Y. enterocolitica* by speciation.
3. In Spain, only hospitalised cases are notifiable.

There has been no clear trend in the total number of cases reported within EU (14-20 reporting MS per year) from 2000 to 2004. But an increasing trend (24%) was observed in the number of cases from the 9 MS (including both old and new MS) that reported and had notification throughout this period (Figure YE1).

Figure YE1. Total number of reported cases and EU trend of human yersiniosis, 2000-2004



Note: EU trend was based on data from nine MS: Austria, Belgium, Czech Republic, Denmark, Finland, Latvia, Lithuania, Slovenia and Sweden, with notification and reporting of yersiniosis throughout the entire period.

Sixteen MS reported the age distribution for at least 10 cases of yersiniosis in 2004. Approximately 25% of the *Y. enterocolitica* cases were children 1-4 years of age and another 25% of the cases were children aged 5-14 years. This overall distribution covers a heterogeneous age distribution between countries with the more important differences being an excess of infants among Spanish cases and an excess of elderly among cases from Finland and Great Britain.

Thirteen countries reported that the majority of yersiniosis cases are known or assumed to be domestically acquired. No countries consider travel activity to contribute significantly to the burden of human yersiniosis except for Sweden and Norway. In Sweden the recent increase in number of cases was largely due to an increase in travel-related cases. In general, the cases of yersiniosis are sporadic but outbreaks have been reported from Austria, Denmark, Finland and Hungary.

For additional information on data provided on *Yersinia* in humans, please, refer to Level 3, Table YE1-YE3.

3.7.2. Yersinia enterocolitica in food

Seven MS provided data on *Y. enterocolitica* in pig meat and products thereof. The following description presents the result from six MS and 12 investigations, in which at least 25 samples were tested. The proportion of positive samples in fresh pig meat at retail ranged from 0-10.4%. The highest positive proportion was reported from Sweden, where a PCR method was used for detection (see textbox). Belgium, Czech Republic and Germany did not detect *Y. enterocolitica* in fresh pig meat. For samples of meat products, the proportion of positive samples ranged from 0% to 8.8%, the highest from Italy in samples taken at retail using greater sample weights (Table YE2).

Table YE2. *Y. enterocolitica* in pig meat and products thereof[1], 2004

	N	Positive	% Positive	Product	Sampling location	Sample weight
Belgium	198	0	0	Fresh, minced meat	Processing	1g
	103	0	0	Fresh, minced meat	Retail	1g
Czech Republic	93	0	0	Fresh	-	-
Germany	36	0	0	Fresh	Retail	-
Italy	62	1	1.6	Fresh	Retail	25g
	85	3	3.5	Fresh	Slaughter	25g
	33	1	3	Meat products	Processing	25g
	148	13	8.8	Meat products	Retail	25g
Spain	135	7	5.2	Fresh	-	-
	137	0	0	Meat products	-	-
Sweden	933	97	10.4	Fresh	Retail	10g
	522	35	6.7	Meat products	Retail	10g

1. Data are only presented for sample size >25.

Four MS reported adequate data on *Y. enterocolitica* in bovine meat, cow milk and dairy products to be included in Table YE3. For samples of fresh bovine meat, the proportion of positive samples ranged from 0-7% with the highest found in bovine meat from Italy sampled at retail with a greater sample weight. In contrast, Italy did not detect *Y. enterocolitica* in any samples taken at slaughter. Czech Republic examined 135 samples of raw milk without detection of *Y. enterocolitica*. All dairy products tested by Czech Republic, Italy and Slovenia were negative.

Table YE3. *Y. enterocolitica* in bovine meat, and milk and dairy products, 2004

	N	Positive	% Positive	Product	Sampling location	Sample weight
Bovine meat and products thereof						
Italy	57	4	7	Fresh	Retail	25g
	50	0	0	Fresh	Slaughter	25g
Spain	31	1	3.2	Fresh	-	-
Milk and dairy products						
Czech Republic	135	0	0	Raw milk	-	250ml
	751	0	0	Unspecified product	-	-
Italy	35	0	0	Unspecified product	Dairy	25g
Slovenia	188[1]	0	0	Ready-to-eat products	Processing	-

1. In Slovenia, number of batches.

Five 5 MS provided data on *Y. enterocolitica* in poultry meat (Table YE4). Of these, three reported results from investigations including more than 25 samples, and only Germany detected positive samples.

Table YE4. *Y. enterocolitica* in poultry meat and products thereof[1], 2004

	N	Positive	% Positive	Product	Sampling location	Sample weight
Germany	58	3	5.2	Meat products	Processing	-
Italy	25	0	0	Fresh	Processing	25g
Spain	127	0	0	Fresh	-	-

1. Data are only presented for sample size >25.

Several other types of foodstuffs were tested for *Yersinia*, but generally the number of samples was low. Two MS, however, tested a substantial number of samples of red meat (animal species not specified). Of 57 examined samples, Germany found 1.8% positive samples. In Slovenia, the findings were 2.0% positives of 100 samples. Of particular interest, Slovenia, also tested 240 samples from products sold as delicatessen and 150 samples of sweets and found a prevalence of 3.3% and 1.3%, respectively.

For additional information on data provided on *Yersinia* in food, please, refer to Level 3, Table YE4.

Increased prevalence of Yersinia in food using PCR for detection

An investigation of fresh pig meat in Norway (1997-98) indicated presence of pathogenic *Y. enterocolitica* in 17% of the samples using a PCR method for detection, while *Y. enterocolitica* O:3 was isolated from only 2% of the samples using conventional culture methods. Swedish PCR investigations of fresh pig meat and products thereof in 2004, found 10.4% and 6.7%, respectively, of the samples *Yersinia* positive.

3.7.3. Yersinia enterocolitica in animals

Seven MS provided data on *Y. enterocolitica* in farm animals. Results from six MS reporting on investigations comprising more than 25 samples or herds are presented in Table YE5.

The individual proportion of positive pigs varied from 0-10.4% with the highest positive proportion in Denmark. Comparing 2004 data with data from previous years, the prevalence seems to be relatively stable within individual MS. Thus, in Portugal no pigs were found positive in the years 2001 to 2004. In Denmark, the annual proportion of positive animals varied from 12.7-17% in the period from 1999 to 2003, which is very similar to the results from 2004. Italy was the only country reporting results on herd level. Of 36 examined pig herds 5.6% were positive. Similar herd prevalence was found in 2002 and 2003, whereas all 73 Italian herds examined in 2001 were negative.

Table YE5. *Y. enterocolitica* in farm animals, 2004

	Country	N	Positive	% Positive	Epidemiological Unit
Pigs	Denmark	576	60	10.4	Animal
	Germany	6,751	63	0.9	Animal
	Ireland	273	0	0	Animal
	Italy	36	2	5.6	Herd
	Italy	43	0	0	Animal
	Portugal	264	0	0	Animal
Cattle	Germany	8,483	77	0.9	Animal
	Ireland	4,375	0	0	Animal
	Italy	444	78	17.6	Animal
	Italy	40	0	0	Herd
	Portugal	267	1	0.4	Animal
Sheep	Germany	894	1	0.1	Animal
	Ireland	717	0	0	Animal
	Italy	480	1	0.2	Animal
	Portugal	127	0	0	Animal
Goats	Germany	260	0	0	Animal
	Portugal	54	0	0	Animal
Solipeds	Germany	1,623	0	0	Animal
	Ireland	1,263	0	0	Animal
Poultry	Germany	1,890	0	0	Animal
	Ireland	300	0	0	Animal
	Portugal	205	0	0	Animal
Farmed fish	Lithuania	210	0	0	Animal

In cattle, four MS reported proportions of positive animals ranging between 0-17.6% (Table YE5). The highest proportions of positive animals was observed in Italy, where the positive proportion appears to have increased rapidly over the last six years, from 1.9% in 1999 to 17.6% in 2004.

The occurrence of *Y. enterocolitica* was very low in the other farm animals examined (Table YE5). Lithuania was the only MS to provide data from a study in farmed fish. No positive samples were found.

Y. enterocolitica prevalence in pigs/pig meat and cattle/bovine meat

In general, pigs and pig meat are believed to be the main source of human yersiniosis in most EU MS. In 2004, the occurrence of *Y. enterocolitica* in cattle/bovine meat appeared to be very similar to the prevalence in pigs/pig meat. Very few *Y. enterocolitica* strains were serotyped. Additional information on the serotype distribution of *Y. enterocolitica* in non-porcine animals and food sources may provide important information to attribute sources to human cases of yersiniosis.

Dogs are known carriers of Yersinia. In 2004, three MS provided adequate data from studies of dogs (Table YE6). In general, the occurrence in dogs was low (0.3-1.1%). Germany also examined 1,063 cats, only 1 (0.1%) was positive for *Y. enterocolitica*. Finally, Italy reported no positive finding in two local surveys on rabbits (N=75) and wild-living hares (N=39), and no positive animals were detected in an investigation of zoo animals in Portugal (N=86).

Twenty-two animal isolates of *Y. enterocolitica* were serotyped. Thirteen isolates from German cattle were serotype 0:9, the remaining strains from cats (1, Germany), dogs (1, Germany), pigs (6, Germany and Slovakia) and unknown animals species (1, Slovakia) were serotype O:3.

Table YE6. *Y. enterocolitica* in dogs, 2004

	N	Positive	% Positive
Germany	1,703	19	1.1
Ireland	331	1	0.3
Portugal	45	0	0

For additional information on data provided on Yersinia in animals, please, refer to Level 3, Table YE5.

3.7.4. Summary on Yersinia

Twenty MS reported a total of 10,381 cases of human yersiniosis in 2004, where two thirds of the cases were reported from Germany. The overall EU-25 incidence in 2004 was 2.7 cases per 100,000 population. The incidence was higher in MS with a notification system than in MS without notification. There has been no clear trend in the total number of cases reported within the EU from 2000 to 2004. But an increasing trend was observed in the number of cases from the nine MS that reported and had notification throughout the period.

The occurrence of *Yersinia* in pig meat and bovine meat appears to be quite similar, and higher than the occurrence observed for other food sources. The same applies for pigs and cattle compared to other farm animals.

Based on the frequent isolation of the most common human pathogenic *Yersinia* subtypes in pigs and pork, several countries (Belgium, Czech Republic, Denmark, Estonia, Finland, Lithuania, Sweden and Norway) consider the porcine reservoir to be the main source for human infection. However, the relatively high occurrence of *Yersinia* in cattle and bovine meat in some MS indicate that also other sources may contribute significantly to human infections.

There appeared to be no significant difference between old and new MS in the overall *Yersinia* situation.

3.7.5. Sources of Yersinia data

In 2004, mandatory notification of yersiniosis was reported to take place in 16 MS (Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, Germany, Hungary, Ireland, Italy, Latvia, Lithuania, Slovakia, Slovenia, Spain and Sweden) and in the non-MS Norway. Notification in Belgium was restricted to the Flemish community. Registration of human yersiniosis through less comprehensive or voluntary reporting systems takes place in most other MS with the exception of France, The Netherlands and the United Kingdom. Cyprus, Italy, Luxembourg, Malta and The Netherlands did not provide any data. Eight EU-10 countries and 12 EU-15 countries reported cases of yersiniosis in 2004. In all reporting countries, cases were identified through passive surveillance based on culture-confirmed clinical cases reported by laboratories and/or physicians to the authorities.

A notification system for Yersinia in foodstuffs exists in Austria, Belgium, Estonia, Italy, Slovakia, Slovenia, Spain and The Netherlands. Data on *Yersinia* in food samples were provided from 9 MS in 2004 (Austria, Belgium, Czech Republic, Germany, Italy, Portugal, Slovenia, Spain and Sweden). Data from Belgium, Czech Republic, Germany, Italy, Slovenia, Spain and Sweden were obtained through monitoring programmes or national surveys, and in Italy from the industry HACCP/own control as well. With the exception of Slovenia, these MS all provide data from sampling of fresh pig meat. Several MS report data on milk/dairy products, bovine meat and poultry meat as well. In Belgium and Sweden only samples of pig meat were examined.

The detection methods for *Yersinia* in foodstuffs were reported by 4 MS, and comprised different versions of ISO 10273 (Austria, Czech Republic and Slovenia) and PCR (Sweden). Thus, differences in diagnostic sensitivity should be kept in mind, when interpreting differences in prevalence between countries.

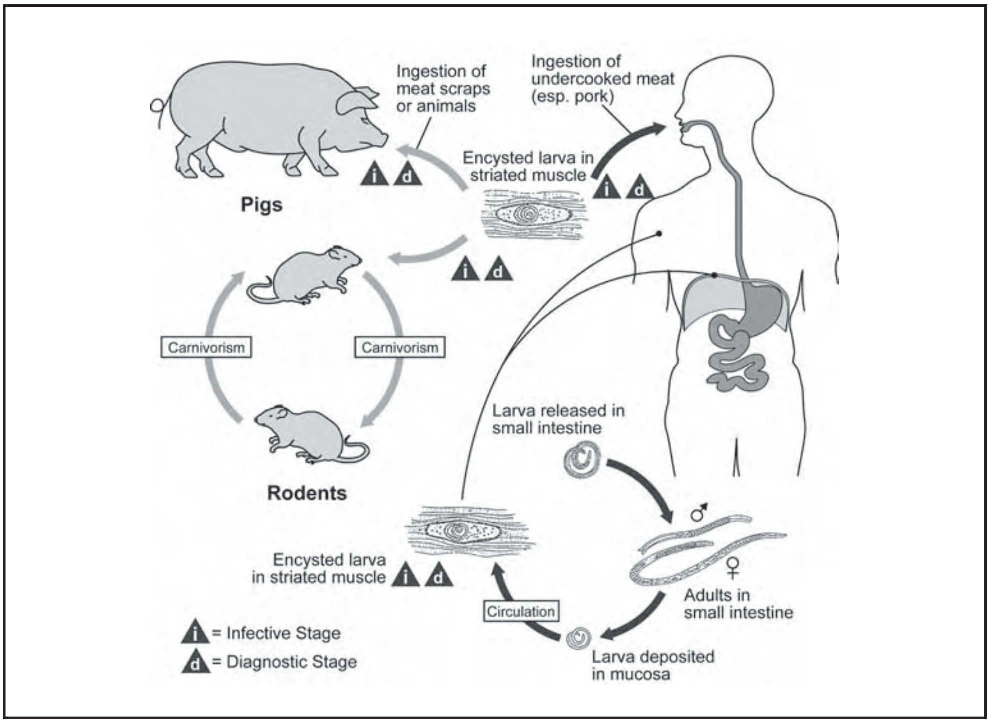
Yersinia infections in animals are notifiable in Belgium, Lithuania, Slovenia, Spain, and The Netherlands and notification of clinical cases take place in Latvia. Only 8 MS: Denmark, Germany, Ireland, Italy, Latvia, Lithuania, Portugal and Slovakia reported any sampling from animals. Of these, substantial numbers of samples were tested in Denmark (pigs), Lithuania (screening of farmed fish) and from several animal species in Germany, Italy, Ireland and Portugal.

Overview of notification is presented in Appendix, Table YE1.

3.8. Trichinella

Trichinellosis is a zoonotic disease caused by a parasitic nematode of the genus *Trichinella*. These parasites have a wide range of host species, mostly mammals. The *Trichinella* larvae undergoes all stages of the life cycle, from larva to adult, in the body of a single host, see Figure TR1.

Figure TR1. Lifecycle of *Trichinella*



Source: Centers for Disease Control and Prevention – U.S.A. – http://www.dpd.cdc.gov/dpdx/

In Europe, trichinellosis has been described as an emerging and/or re-emerging disease during the past decades. Four species are found: *T. spiralis*, *T. nativa*, *T, britovi* and *T. pseudospiralis*. The majority of human infections are caused by *T. spiralis*, *T. nativa* and *T. britovi*.

Infection is acquired by eating raw or inadequately cooked meat of an infected animal. The most common sources of human infection worldwide are pig meat, wild boar meat, and other game meat. However, horse, dog, and many other animal meats have also transmitted the infection.

The clinical signs of acute trichinellosis are characterised by two phases: one phase where the parasites are present in the intestine and one phase where the parasites are circulating and/or present in the musculature. The first symptoms of trichinellosis may include nausea, diarrhoea, vomiting, fatigue, fever, and abdominal discomfort. Symptoms such as headaches, fevers, chills, cough, eye swelling, aching joints and muscle pains, itchy skin, diarrhoea, or constipation may follow. In more severe cases difficulties coordinating movements, and heart and breathing problems may appear. In most severe cases, death can occur.

3.8.1. Trichinellosis in humans

In 2004, Germany, Latvia, Lithuania, Poland, Slovakia and Spain reported human cases of domestic trichinellosis. Denmark, France, Germany and Sweden reported imported cases, either because of travel abroad or from privately imported meat.

The total number of human trichinellosis cases reported increased by almost three fold, from 97 cases in 2003 to 270 cases in 2004. However, 172 cases alone were reported from Poland that reported for the first time. Poland had four outbreaks involving 157 patients in 2004. In the EU-15 countries the annual number of reported cases has varied between 48 and 97 cases during last 6 years (Table TR1).

Table TR1. Reported cases of trichinellosis in humans, 1999-2004, and incidence in 2004[1]

	2004	2004	2003	2002	2001	2000	1999
	Cases/ 100,000 population	No. of cases: Total (imported)					
Austria	0	0	3	1	0	2 (2)	3 (3)
Belgium	0	0	-	-	-	-	-
Cyprus	0	0	-	-	-	-	-
Czech Republic	0	0	-	-	-	-	-
Denmark	0.17	9 (9)	0	0	0	0	0
Estonia	0	0	-	-	-	-	-
Finland	0	0	0	0	0	0	0
France	0.01	3 (3)	6	4 (4)	0	-	2
Germany	0.01	5 (4)	3 (3)	10	5	4	22 (9)
Greece	0	0	0	0	0	0	
Hungary	0	0	-	-	-	-	-
Ireland	0	0	0	0	0	0	
Italy	0	0	0	2	0	21	0
Latvia	1.03	24	22	-	-	-	-
Lithuania	0.64	22	19	-	-	-	-
Luxembourg	-	-	-	-	-	-	-
Malta	-	-	-	-	-	-	-
Poland	0.45	172	-	-	-	-	-
Portugal	-	-	0	1	0	-	-
Slovakia	0.02	1	-	-	-	-	-
Slovenia	0	0	-	-	-	-	-
Spain	0.08	33(1)	39	26	44	38	13
Sweden	0.01	1 (1)	0	0	0	0	0
The Netherlands	0	0	5 (4)	4 (2)	3	2 (2)	7 (6)
United Kingdom	0	0	0	0	1 (1)	0	1 (1)
EU-Total	**0.06**	**270**	**97**	**48**	**53**	**67**	**48**
Norway	0	0	0	0	0	0	0

Note: Figures in brackets are reported imported cases, values are included in the total number of cases.
1. EU-Total incidence is based on population in reporting countries.

For additional information on data provided on *Trichinella* in humans, please, refer to Level 3, Table TR1 and TR2.

3.8.2. Trichinella in animals

All MS and Norway reported data for *Trichinella* in animals. In 2004, Austria, Cyprus, Denmark, Greece, Ireland, Italy, Luxembourg, Malta, Norway and UK did not report any findings of *Trichinella* in animals (Table TR2).

Trichinella was found in domestic pigs in Finland, France, Lithuania, Poland, Slovakia and Spain, however, the prevalence was below 0.001%. *Trichinella* was not detected in horsemeat in 2004 and has only been detected in 1999 and 2001 in two horsemeat samples from France (Table TR2 and TR3). In Finland, the prevalence in pigs has been decreasing during the last couple of years, which may be a result of more industrialised management.

In wild boars, *Trichinella* was found more frequently. Results showed a proportion of positive samples of 0.1% in the EU. In total, 70% of the positive wild boars were recorded from EU-10 MS, although the number of wild boars examined from these MS represented only 43% of the total samples. The highest number of positive wild boars (240 cases) was reported by Poland.

In the other wildlife population, the proportion of *Trichinella* positive samples was higher than within the domestic animal population (Table TR2). Positive findings were reported from 9 MS with a total positive proportion of 3%. As in previous years, Finland reported more than 50% of these positive samples (mostly foxes, lynx and racoon dogs) with a proportion of positive samples of 18.2%. In Slovakia, 12.6% of samples (mainly foxes) investigated were positive for Trichinella. Belgium, France, Hungary, Lithuania, Portugal and Sweden also reported positive findings in foxes. For a total list of wild animal species where *Trichinella* has been isolated see Level 3, Table TR3.

Table TR2. Number of reported *Trichinella* findings in animals, 2004

	Pigs		Horses		Wild boar		Other wildlife	
	N	Positive	N	Positive	N	Positive	N	Positive
Austria	5,397,670	0	1,033	0	31,947	0	-	-
Belgium	10,284,186	0	11,416	0	8,167	1	307	1
Cyprus	357,638	0	-	-	0	-	-	-
Czech Republic	4,298,706	0	351	0	73,489	2	28	0
Denmark	24,945,030	0	1,278	0	0	-	-	-
Estonia	444,084	0	4	0	6,185	10	17	3
Finland	2,368,495	3	725	0	1,006	0	925	168
France	271,100	10[2]	23,619	0	26,287	0	182	1
Germany	-	-	-	-	102,726	1	5,653	0
Greece	377,242	0	-	-	32	0	-	-
Hungary	4,703,371	0	3	0	42,110	0	402	1
Ireland	3,801	0	58	0	0	0	-	-
Italy	10,044,378	0	43,139	0	35,006	0	2	0
Latvia	419,105	0	239	0	1,022	12	19	0
Lithuania	867,757	21	-	-	9,168	78	159	9
Luxembourg	323	0	21	0	1,482	0	-	-
Malta	840	0	249	0	0	-	-	-
Poland	19,766,359	29	39,145	-	76,698	240	4	0
Portugal	6,162	0	-	-	213	0	221	14
Slovakia	1,151,763	2	-	-	15,063	2	715	90
Slovenia	443,513	0	857	0	5,472	1	-	-
Spain	35,707,576	4	25,836	0	82,536	121	628	0
Sweden	3,337,488	0	5,033	0	6,191	1	382	19
The Netherlands	14,340,981	0	2,187	0	945[1]	1	-	-
United Kingdom	867,612	0	832	0	0	-	1,048	0
EU-Total	**140,405,180**	**69**	**156,0219**	**0**	**523,579**	**470**	**10,695**	**306**
Norway	1,469,200	0	2,000	0	0	-	3	-

1. In The Netherlands, 534 of the collected samples were part of a prevalence survey and 34 positive observations were detected using a serological method only (not presented in this table).
2. In France, Corsican pigs farmed outdoor in contact with wildlife.

In the United Kingdom, two surveys from Great Britain and Northern Ireland were carried out concerning *Trichinella* in foxes. In both surveys, *Trichinella* was not detected.

An overview of the *Trichinella* findings in domestic animals and wildlife since 1999 is given in Table TR3.

Table TR3. *Trichinella* in animals, 1999-2004

	2004			2003			2002			2001			2000			1999		
	Pigs	**Horse**	**Wildlife**	**Pigs**	**Horse**	**Wildlife**	**Pigs**	**Horse**	**Wildlife**	**Pigs**	**Horse**	**Wildlife**	**Pigs**	**Horse**	**Wildlife**	**Pigs**	**Horse**	**Wildlife**
Austria	0	0	0	0	0	+	0	0	+	0	0	+	0	0	+	0	0	0
Belgium	0	0	+	0	0	-	0	0	0	0	0	0	0	0	-	0	0	0
Cyprus	0	-	-	0	0	0												
Czech Republic	0	0	0															
Denmark	0	0	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Estonia	0	0	+															
Finland	+	0	+	+	0	+	+	0	+	+	0	+	+	0	+	+	-	+
France	+[3]	0	+	0	0	+	0	0	+	0	+	0	0	0	0	0	+	+
Germany	-	-	+	-	-	+	+	-	+	0	0	0	-	-	+	0	0	+
Greece	0	-	0	0	-	0	0	-	0	0	-	0	0	-	0	0	-	-
Hungary	0	0	+															
Ireland	0	0	0	0	0		0	0	+	0	0	-	0	0	-	0	0	0
Italy	0	0	0	0	0	+	0	0	+	0	0	+	0	0	0	0	0	0
Latvia	0	0	+	+	-	+												
Lithuania	+	-	+	+	-	+												
Luxembourg	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	0
Malta	0	0	-															
Poland	+	-	+															
Portugal	0	-	0	0	-	-	0	-	0	-	-	0	0	-	0	0	-	0
Slovakia	+	-	+	0	-	-												
Slovenia	0	0	+	0	0	-												
Spain	+	0	+	+	0	+	+	0	+	+	0	+	+	0	+	+	0	+
Sweden	0	0	+	0	0	+	0	0	+	0	0	+	0	0	+	0	0	+
The Netherlands	0	0	+[2]	0	0	+[2]	+	0	+[2]	0	0	+[2]	0	0	+[1]	+	0	+[1]
United Kingdom	0	0	0	-	0	0	0	0	0	0	0	-	0	0	0	0	-	-
Norway	0	0	0	0	0	+	0	0	+	0	0	0	0	0	0	0	0	0

+: *Trichinella* detected.
0: *Trichinella* not detected.
-: No data reported.
Blank: MS were not EU members at the time and therefore reported no data. Latvia, Lithuania, Slovakia and Slovenia reported on a voluntary basis in 2003.
1. In The Netherlands, low grade infections (1 larva in 16 g muscle tissue).
2. In The Netherlands, positive cases in wildlife refer to serology testing results, only in 2004 was 1 positive sample recorded using digestion method.
3. In France, Corsican pigs farmed outdoor in contact with wildlife.

3.8.3. Summary on Trichinella

Generally, few cases of *Trichinella* in humans are reported in EU and Norway, and as in previous years, some MS have reported all or the majority of human cases as a result of private import of meat infected with *Trichinella* or consumption abroad of meat not examined for *Trichinella*.

A much higher prevalence of *Trichinella* is observed in the wildlife population compared to the domestic animals indicating that the wildlife serves as a reservoir of the parasite. Generally, the outbreak investigations point to the fact that humans become ill after consuming meat slaughtered without authorised meat inspection.

MS from the eastern part of EU have the highest prevalence of *Trichinella* among wildlife and domestic animals. Also the highest number of domestic human cases was reported by these countries. A number of the new MS were among the countries with highest infection rates.

3.8.4. Sources of Trichinella data

All MS and Norway included information about *Trichinella* in their report for 2004. All pigs and horses, wild boars and carnivorous game slaughtered for human consumption must be tested for *Trichinella* at slaughter or alternatively subject to freezing in accordance with Council Directive 64/433/EEC, 91/495/EEC and 92/45/EEC. France, Ireland, Malta and Portugal provided no information whether or not they comply with the directive. The remaining MS and Norway all comply with the directives. See the Appendix, Table TR2 for more information.

Trichinella in humans and in animals is notifiable in most MS and Norway. In Cyprus, *Trichinella* became notifiable in humans as of 2005. In Denmark and United Kingdom, *Trichinella* in humans is not notifiable. France (animals), Ireland (animals), Italy (animals), Luxembourg and Malta did not report if *Trichinella* is notifiable. *Trichinella* in foodstuffs is notifiable in Austria, Belgium, Estonia, Finland, Greece, Hungary, Italy, Norway, Portugal, Slovakia, Slovenia, Spain, Sweden and United Kingdom. See the Appendix, Table TR2 for more information.

In humans, most MS and Norway diagnose *Trichinella* infections based on clinical symptoms, serology (ELISA), histopathology and Western blot. Belgium, Czech Republic, Greece, Ireland, Italy, Luxembourg, Malta, Portugal, Slovakia, Slovenia, Spain, The Netherlands, United Kingdom provided no information on diagnostic methods used to detect this pathogen in humans.

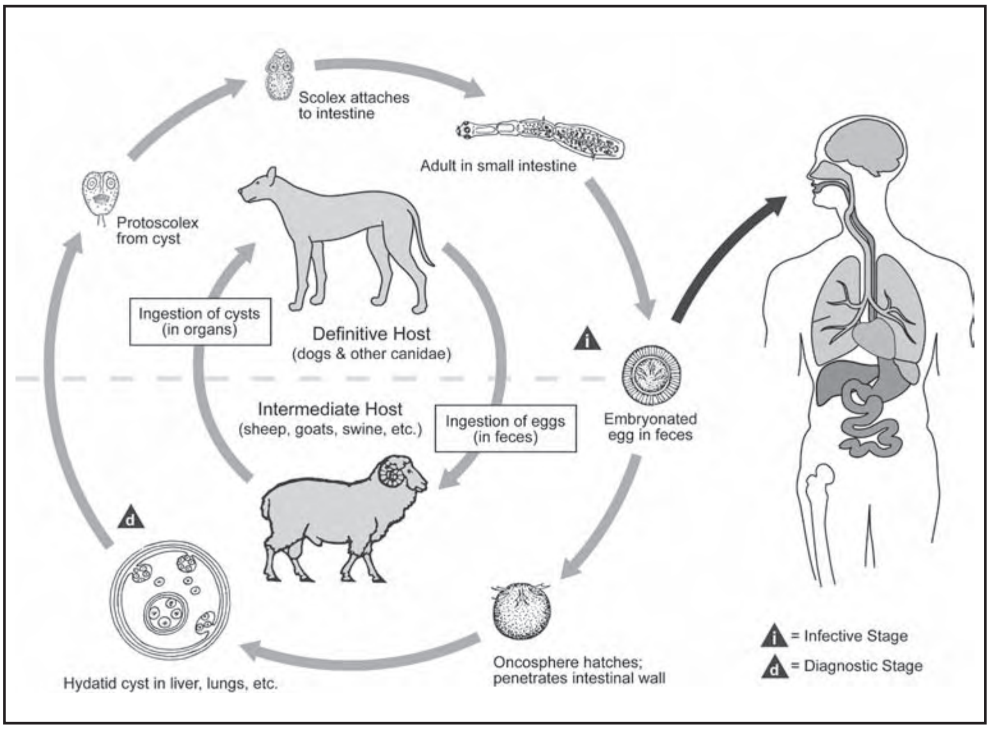
Generally, for diagnosis of *Trichinella* in animals, the MS and Norway use the digestion and compression methods described in Directive 77/96/EEC. Ireland, Lithuania and Poland provided no information concerning diagnostic methods used in animals. See the Appendix, Table TR1 for more information.

3.9. Echinococcus

Human echinococcosis (also known as hydatid disease) is caused by small tapeworms of the genus *Echinococcus*. In Europe, this disease is caused by two of the four recognised species, namely *E. granulosus* or *E. multilocularis*.

E. granulosus lives in the small intestines of foxes, dogs and other canids. Humans may become infected through accidental ingestion of the eggs of the tapeworm, excreted in the fae ces of infected animals. The eggs may enter the bloodstream and migrate to the liver, lungs and other tissues to develop into cysts, developing unnoticed over many years, and may ultimately rupture, see Figure EH1. Clinical symptoms and signs depend on the location of the cyst and are similar to those of a slowly growing tumour. Sheep and cattle may also be particularly prone to this infection.

Figure EH1. Lifecycle of *E. granulosus*



Source: Centers for Disease Control and Prevention – U.S.A. – http://www.dpd.cdc.gov/dpdx/

E. multilocularis is the causative agent of highly pathogenic alveolar echinococcosis in man and other mammals. The red fox is the most important definitive host in Europe, although dogs, and occasionally cats, may also be infected with the adult parasite. Eggs shed by the definitive host develop into an intermediate stage in rodents, which serve as intermediate hosts. In accidental cases, humans may also acquire *E. multilocularis* infection by egg ingestion. Although a rare disease in humans, alveolar echinococcosis is of considerable public health importance because it is fatal in up to 100% of untreated patients.

3.9.1. Echinococcosis in humans

In 2004, a total of 343 human cases of echinococcosis was registered in 19 MS (Table EH1), which represents an incidence of 0.1 per 100,000 population. Incidence ranged from less than 0.1 per 100,000 in Belgium, France and Spain to 0.5 per 100,000 population in Portugal. Compared to 2003, there was a decrease in the number of cases reported in 2004, for those 14 MS that reported data in both years. In these MS, a total of 445 cases were reported in 2003 versus 322 in 2004. Spain, however, reported a marked decrease from 445 cases in 2003 to 6 in 2004. This decrease is most likely a result of a continued animal hydatiodosis education control programme, particularly in endemic regions with extensive animal production.

Table EH1. Reported cases of echinococcosis in humans, 2000-2004, and incidence in 2004[1]

		2004			2004	2003	2002	2001	2000	1999
	Cases/ 100,000 population	% Species distribution			*Echinococcus* spp.					
		E. g.[2]	*E. m.*[3]	*E.spp.*[4]	No. of cases					
Austria	0.3	84	16	-	25	34	-	-	-	30
Belgium	<0.1	-	100	-	1	-	-	-	-	-
Cyprus	-	-	-	-	0	2	-	-	-	-
Czech Republic	-	-		-	-	-	-	-	-	-
Denmark	0.2	89	11	-	9	0	0	0	0	0
Estonia	-	-	-	-	0	1	0	0	1	0
Finland	0.1	75	-	25	4	2	0	0	0	0
France	<0.1	-	100	-	17	6	-	-	6	10
Germany	0.1	68	16	15	97	86	-	515	-	-
Greece	0.2	-	-	100	26	17	24	37	20	105
Hungary	0.1	36	-	64	11	-	-	-	-	-
Ireland	-	-	-	-	-	-	-	-	-	-
Italy	-	-	-	-	-	1	-	-	-	-
Latvia	0.1	100	-	-	2	4	-	-	-	-
Lithuania	0.4	93	7	-	15	2	-	-	-	-
Luxembourg	-	-	-	-	-	-	-	-	-	-
Malta	-	-	-	-	-	-	-	-	-	-
Poland	0.1	86	14	-	21	34	40	37	-	-
Portugal	0.5	100	-	-	57	42	11	19	26	133
Slovakia	-	-	-	-	-	-	-	-	-	-
Slovenia	0.1	-	-	100	1	1	-	-	-	-
Spain[5]	<0.1	-	100	-	6	167	175	17	181	228
Sweden	0.1	-	-	100	9	4	14	8	3	5
The Netherlands	0.2	100	-	-	34	36	32	44	52	31
United Kingdom	<0.1	100	-	-	8	11	10	11	17	13
EU-Total	**0.1**	**57**	**7**	**36**	**343**	**450**	**306**	**688**	**306**	**555**
Norway	-	-	-	-	0	0	0	0	0	0

1. EU-Total incidence is based on population in reporting countries.
2. *Echinococcus granoulosus*.
3. *Echinococcus multilocularis*.
4. *Echinococcus* spp.
5. In Spain, only hospitalised cases are notifiable.

Data on human cases as well as age distribution of human cases of echinococcus are presented in Level 3, Tables EH1 and EH2.

3.9.2. Echinococcus in animals

In general, the prevalence of *Echinococcus* was low in farm animals. However, in some MS the parasite was found in relatively high numbers in cattle, goats and pigs. Guidelines for the control of the pathogen through meat inspection of animal carcasses for human consumption are provided through Council Directive 64/433/EEC, whereby monitoring of all slaughtered animals is carried out by official veterinarians examining organs and muscles intended for human consumption. Whole carcasses or organs are destroyed in cases where *Echinococcus* cysts are found.

For the Mediterranean MS, namely Greece, Italy, Portugal and Spain, *E. multilocularis* is known to have been prevalent in the past. In 2004, the overall detection of *Echinococcus* in these MS decreased compared to previous years, Table EH2. Italy, for example, reported a six-fold decrease in prevalence in sheep, and an eight-fold decrease in goats compared to 2003. A notable decrease in the detection of this parasite was also reported by Spain. This was a continuance of the decreasing trend, which has been observed in Spain since 1999.

Table EH2. Prevalence of *Echinococcus* in farm animals detected through meat inspection in selected Mediterranean MS, 1999-2004

	2004 %	2003 %	2002 %	2001 %	2000 %	1999 %
Cattle						
Greece	1.19	0.99	1.37	1.89	3.30	2.34
Italy	0.51	1.35	0.85	1.36	0.97	0.41
Spain	0.10	0.60	0.70	0.80	1.00	-
Goats						
Greece	0.31	0.52	0.57	0.80	0.80	0.99
Italy	0.19	1.60	2.89	6.29	0.96	2.72
Sheep						
Greece	1.89	2.83	3.21	3.21	2.86	3.07
Italy	0.96	6.28	2.04	6.08	6.86	7.25
Pigs						
Greece	0	0	0.99	0	0.01	0
Italy	0.01	0.01	0.02	0.03	0.02	0.02
Portugal	3.10	-	-	-	100.00	-

Table EH3. Findings of *Echinococcus* in farm animals in old and new MS, 2004

	Old MS				New MS			
	Belgium	**Greece**	**Italy**	**Spain**	**Latvia**	**Poland**	**Slovakia**	**Slovenia**
Cattle								
N	881,535	115,417	2,171,690	602,247	117,120	1,280,960	115,398	144,884
Pos	48	1,368	11,023	624	0	140	35	1
% Pos	0.01	1.19	0.51	0.10	0	0.01	0.03	<0.01
Goats								
N	3,814	474,847	25,220	260,926	-	223	-	-
Pos	0	1,469	47	276	-	30	-	-
% Pos	0.00	0.31	0.19	0.11	-	13.45	-	-
Sheep								
N	87,119	1,527,086	910,189	2,116,493	3,696	29,862	83,052	-
Pos	2	28,916	8,727	1,014	0	6,300	26	-
% Pos	<0.01	1.89	0.96	0.05	0	21.10	0.03	-
E. granulosus	-	-	-	230	-	-	-	-
% *E. granulosus*	-	-	-	0.01	-	-	-	-
Pigs								
N	11,229,149	848,589	9,657,804	14,282,677	419,105	19,766,359	1,151,763	443,513
Pos	0	0	483	0	268	989,760	1,303	234
% Pos	0.00	0	0.01	0.00	0.06	5.01	0.11	0.05
Horses								
N	-	-	51,814	7,284	239	39,145	-	857
Pos	-	-	18	5	0	-	-	0
% Pos	-	-	0.03	0.07	0	-	-	0

Note: Portugal found 44 (3.1%) of 1,438 pigs positive for *E. granulosus.*
Lithuania found 71 (2.8%) of 2,503 pigs positive for *E. granulosus*.
Cyprus found 1 of 110,372 pigs positive for *E. granulosus*.

Greece reported an increase of positive findings in cattle compared to 2003. This is in contrast to the trend observed since 2000, where the prevalence decreased from 3.3% in 2000 to 0.99% in 2003. In goats and sheep, the prevalences continue to decrease in 2004, a trend that has continued since 1999. No findings of *Echinococcus* in pigs have been reported in Greece in pigs since 2002.

Spain reported a continuing decrease in the detection of this pathogen in cattle. The reported findings in farm animals are presented in table (Table EH3).

Occurrence of *Echinococcus* in farm animals at slaughter was also reported by the new MS Cyprus, Estonia, Latvia, Poland, Slovenia and Slovakia. The highest prevalences were detected in Poland, reporting a prevalence of 21.1% in sheep, 13.5% in goats and 5.0% in pigs (Table EH3). Lithuania found 71(2.8%) of 2,503 pigs positive for *E. granulosus*, but did not report data for any other animal species. Estonia reported 3 pigs (<0.01%) positive out of 444,048 pigs investigated.

In general, little information was provided on the species distribution. However, Portugal found 44 (3.1%) of 1,438 examined pigs positive for *E. granulosus*. Spain found a 0.1% of the investigated sheep positive for *E. granulosus* and in Poland *E. granulosus* was detected in two out of five speciated isolates from sheep.

Study of pets in France/Information campaign in Belgium

In 2004, France conducted a study involving cats and dogs to evaluate the rate of transmission of this disease to man. None of the 70 cats and 130 dogs investigated was found positive.

In an attempt to prevent human disease, Belgium recently launched an information campaign discouraging visitors to parks and woodlands from eating berries.

Data on investigated pets were reported by Cyprus, Germany, Finland, France, Slovakia and Spain. Only Germany reported positive findings of *E. multilocularis* in two out of 88 investigated cats.

Over the past ten years, the population of red foxes has increased in Europe and these animals are progressing into urban zones. This is of particular importance since the red fox is the most important definitive host of *E. multilocularis* in Europe. Increased contact between foxes and humans in urbans areas is a concern, since it may increase the chance of humans becoming infected.

Five MS reported positive findings of *E. multilocularis* in foxes, Table EH4. The largest number of foxes was investigated in Germany and 20.2% of the investigated foxes were found positive. This represented a decrease in the number of positive findings compared to 2003, and broke the increasing trend that has been observed from 1999-2003. The highest proportion of positive foxes was found Slovakia. *E. multilocularis* was not found in 355 foxes investigated in Finland and in 6 foxes investigated in Denmark. Sweden investigated 400 foxes in 2004, however, the results of these investigations were not available at the time of writing this report.

Table EH4. MS reporting *E. multilocularis* findings in foxes, 2001-2004

	2004		2003		2002		2001	
	N	%	N	%	N	%	N	%
Austria	86	8.1	807	5.6	592	6.8	-	-
Germany	5,398	20.2	4,483	33.4	7,860	28.4	2,412	16.2
France	986	7.6	-	-	-	-	-	-
Luxembourg	35	14.3	29	27.6	58	37.9	100	20
Slovakia	490	30.2	-	-	-	-	-	-

In other wildlife species, *E. granulosus* was reported in two out of 965 moose and two out of 21 wolves investigated in Finland. Furthermore, Finland found two carcasses of semidomesticated reindeer positive for E. granulosus, out of the 21,129 examined through meat inspection at slaughter. France tested two wild boars and isolated *E. multilocularis* from both animals. In Norway, in the archipelago of Svalbard, *E. multilocularis* was detected in three of 22 tested voles. All reported data are presented in Level 3, Table EH3.

3.9.3. Summary on Echinococcus

In 2004, the total number of human cases caused by *Echinococcus* spp. decreased by approximately 20% in the 17 MS that reported for both years. The majority of the human cases were caused by *E. granulosus*. The reduction may be attributed to a significant decrease of the number of cases reported from Spain. If Spain is removed from the calculation, there was an overall increase in the number of reported human cases. The largest increases were observed in Portugal and Lithuania.

In animals the majority of positive findings were observed in the Mediterranean MS, which is consistent with what has been reported in previous years. However, most of these MS have reported a decreasing trend in the number of positive findings in animals over the last five years. The other old MS reported either no findings or very low prevalences. Six new MS reported data on the occurrence of *Echinococcus*, the highest prevalences were reported in sheep and goats from Poland.

E. multiocularis, the cause of alveolar echinococcosis in humans which may be fatal in untreated patients, was detected in foxes in five MS, and in wild boars in France. With the increasing population of foxes in the Community, and the migration of these animals into urban areas, there may be an increased risk of humans becoming infected. E. granulosus was found in other wildlife such as moose, reindeer and wolves.

As a part of the strategy to control the spread of *Echinococcus*, Cyprus, Finland and Greece reported treating dogs with antiparasitic drugs.

3.9.4. Sources of Echinococcus data

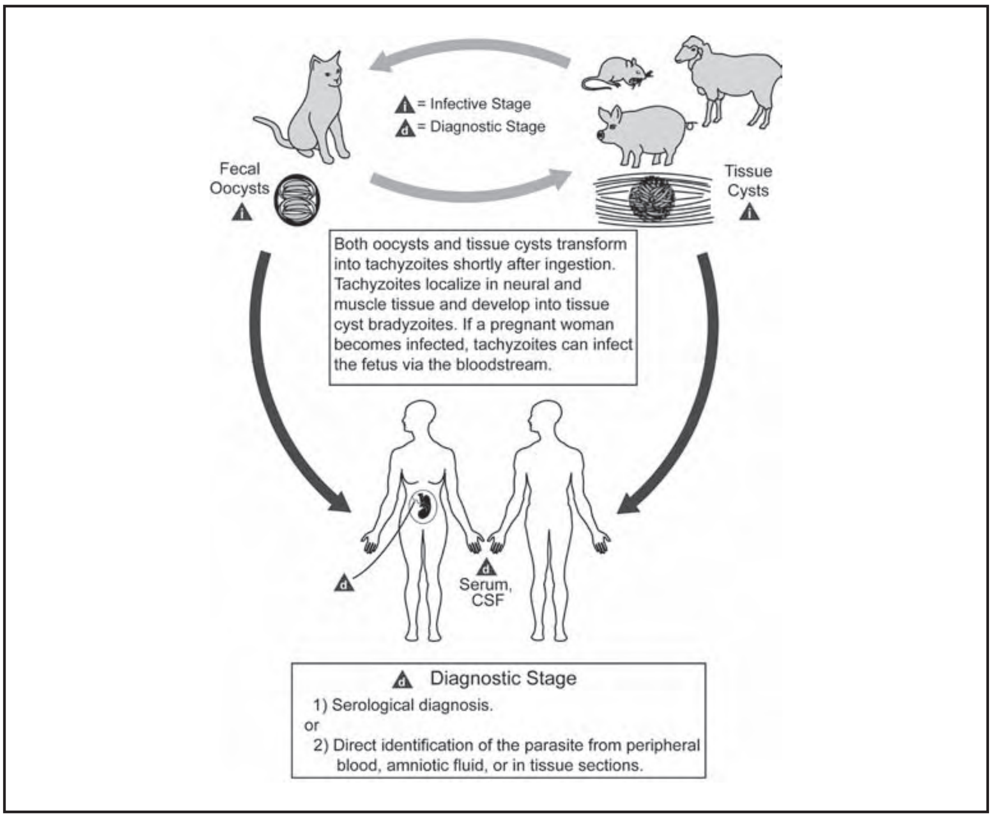
Echinococcosis is notifiable in humans in all MS and Norway, except for Denmark, France, The Netherlands and United Kingdom. From 2005, the disease will become notifiable in Denmark. Cyprus, Luxembourg, Malta and Poland provided no information. In animals, *Echinococcus* detection is notifiable in 14 MS: Austria, Belgium, Denmark, Estonia, Finland, Greece, Latvia, Lithuania, Portugal, Slovakia, Slovenia, Spain, Sweden and The Netherlands, and Norway (Appendix, Table EH2).

For an overview of the monitoring and diagnostic methods, please refer to Appendix, Table EH1.

3.10. Toxoplasma

Toxoplasmosis is a common infection in animals and humans. It is caused by an obligate intracellular protozoan parasite, *Toxoplasma gondii*. Nearly all warm-blooded animals can act as intermediate hosts, and seemingly all animals may be carriers of tissue cysts of this parasite. However, the parasite only matures in domestic and wild cats, which are the definite hosts. The infection may be acquired by humans through the consumption of undercooked contaminated meat or food contaminated with cat faeces or from handling contaminated soil or cat litter trays. Assisting sheep during lambing is also a known risk factor (Figure TO1).

Figure TO1. Lifecycle of *Toxoplasma gondii*



Source: Centers for Disease Control and Prevention – U.S.A. – http://www.dpd.cdc.gov/dpdx/

In humans, the majority of infections is asymptomatic or cause mild flu-like symptoms. However, toxoplasmosis can be life threatening, especially for immunocompromised individuals. If acquired during pregnancy, toxoplasmosis can cause abortion or congenital malformation affecting the brain, eyes or other organs.

In animals, *Toxoplasma* is an important cause of abortion in sheep, but may be controlled by proper management practices and vaccination. In previous years, the detection of this parasite was most frequently reported in cats, dogs, sheep and pigs.

3.10.1. Toxoplasmosis in humans

In 2004, all MS except Belgium, Cyprus, France, Italy, Luxembourg, Malta and The Netherlands reported cases of toxoplasmosis. For the MS not reporting cases, toxoplasmosis is only notifiable in Belgium (French community) and Italy. Thirteen MS specified the number of congenital cases. The vast majority of the cases reported in the EU (approx. 97%) were laboratory-confirmed clinical cases. Exceptions were cases from Austria and Slovenia, which were mainly asymptomatic cases identified via monitoring of pregnant women, and all cases reported from Denmark, which were identified via a neonatal screening programme.

In total, 1,736 human cases of toxoplasmosis were reported from 18 EU MS in 2004 (Table TO1). Few congenital cases (45 cases) were reported from 10 MS, and should be regarded as a minimum, since 8 MS provided no or incomplete information on the type of reported clinical cases.

Table TO1. Reported cases of toxoplasmosis in humans, 2000-2004, and incidence in 2004[1]

	2004	2004	2003	2002	2001	2000
	Cases/ 100,000 population	No. of cases: Total (congenital cases)				
Austria (Upper)[2]	-	29 (0)	39 (1)	-	-	-
Belgium	-	-	-	-	-	-
Cyprus	-	-	-	-	-	-
Czech Republic	3.1	319	455	646	516	670
Denmark[3]	0.2	9 (9)	13 (13)	12 (12)	19 (19)	-
Estonia	1.2	16 (0)	9	4	7	14
Finland	0.8	43	45	34	48	40
France	-	-	-	-	-	-
Germany[4]	0	16 (16)	19 (19)	18 (18)	39 (39)	19 (19)
Greece[4]	0	2 (2)	-	-	-	-
Hungary	1.1	107	-	-	-	-
Ireland	0.8	33	18	15	6	90
Italy	-	-	21	15	-	-
Latvia	0.3	7 (1)	3	-	-	-
Lithuania	5	172 (3)	117	-	12 (12)	-
Luxembourg	-	-	-	-	-	-
Malta	-	-	-	-	-	-
Poland	1.6	602	617	652	446	-
Portugal	0.4	46 (12)	54	-	40	45
Slovakia	2.9	154 (1)	-	-	-	-
Slovenia	1.2	23 (1)	38	-	-	-
Spain[6]	0.1	56	96	78	58	53
Sweden	0.1	5	17	10	18	13
The Netherlands	-	-	-	-	-	-
United Kingdom	0.2	97	113	137	132	128
EU-Total	**0.6**	**1,736 (45)**	**1,674 (33)**	**1,621 (30)**	**1,329 (70)**	**1,072 (19)**
Norway[5]	0	0	1 (0)	0 (0)	0 (0)	0 (0)

1. EU-Total incidence is based on population in reporting countries.
2. In Austria, reporting of congenital and screen positive (pregnant women).
3. In Denmark, only reporting of congenital cases from neonatal screening.
4. In Germany and Greece, only reporting of congenital cases.
5. In Norway, only enchephalotis cases are notifiable.
6. In Spain, only hospitalised cases are notifiable.

In 2004, the overall incidence (cases per 100,000 population) in reporting MS was 0.6. (Table TO1). In MS where human toxoplasmosis is notifiable, the incidences ranged from 0.02 to 5.0 (Germany and Greece compared to Lithuania, respectively).

The incidence in new MS was higher than the incidence in old MS; 1.9 in 8 reporting new MS versus 0.1 in 10 old MS. Only a minor difference was observed between the nine MS with full notification system and the other reporting MS (0.4 versus 0.7).

Overall, an increasing number of toxoplasmosis cases were reported, from 1,072 cases in 2000 to 1,736 cases in 2004 following a parallel increase in the number of reporting MS from 10 to 18.

3.10.2. Toxoplasma in animals

Data on toxoplasmosis in animals were provided from 12 MS and Norway. The majority of the data were from diagnostic submissions, and 12,662 out of 23,948 examined units (animals/samples) were from sheep. Of these, 9,845 were from Italy, where a regional control programme on toxoplasmosis is carried out in Sardinia, as a result of a local high prevalence of *Toxoplasma* infection in sheep and goats and the importance of toxoplasmosis in ovine and caprine abortion.

Animal samples examined for *Toxoplasma* are almost entirely submitted with diagnostic purposes, and often with a specific suspicion of *Toxoplasma* being the causative agent. Thus, the results of the investigations do not reflect the general prevalence in the animal populations nor the overall risk for human exposure.

In 2004, positive animals or samples were found in all animals species examined: cattle, sheep, goats, pigs, solipeds, dogs, cats and pigeons. All reported data are available in Level 3, Table TO2.

Previous serological surveys of *Toxoplasma* in domestic and wild animals indicate that toxoplasmosis is endemic in the EU. In general, most animal species have a high proportion of seropositive samples including cats, which are definitive hosts for *T. gondii*. Only solipeds tend to have a lower proportion of seropositives.

Attempts to control toxoplasmosis in animals, was only reported from Italy (Sardinia), where measures (not specified) were applied in positive flocks of sheep and goats to control the infection.

3.10.3. Summary on Toxoplasma

According to the number of human cases of toxoplasmosis reported by 18 MS in 2004, the disease is not among the most common zoonotic diseases in the EU (overall 0.6 cases per 100,000 population). The vast majority of cases was laboratory-confirmed clinical cases, and only few MS have a routine surveillance for toxoplasmosis in pregnant women or newborns. Congenital cases were rare (2.8% of all reported cases), but information on the syndromes presented in clinical cases was lacking from several countries. The reported incidence was considerably higher in the new MS (EU-10) than in the old MS (EU-15), which in part can be explained by several EU-15 countries reporting cases from a subset of the population or only reporting congenital cases.

Several MS: Belgium, Denmark, Spain and Sweden, and Norway report an effort to avoid the potentially disabling or even fatal congenital infections through advice to women on how to prevent *Toxoplasma* infections during pregnancy.

Data from animals in 2004 were mainly results from diagnostics submissions. In general the focus of toxoplasmosis in animals is on *T. gondii* as an important causative agent for abortions in sheep and goats rather than the food safety aspect, and information on type and method for detection of *Toxoplasma* in animals is lacking from several MS.

3.10.4. Sources of Toxoplasma data

Human infections with *T. gondii* were notifiable in 14 MS in 2004 (Appendix Table, TO2), of which Germany, Greece and Lithuania only notified congenital cases. In United Kingdom *T. gondii* is only notifiable in Scotland. In Cyprus, notification began January 2005, and in Sweden notification was discontinued in July 2004. No information on notification was provided from Luxembourg, Malta, Poland and Portugal. Norway reported no cases in 2004, but has a notification system for *T. gondii* infections associated with encephalitis (Appendix, Table TO2).

In 2004, toxoplasmosis in animals was notifiable in 8 MS: Belgium, Finland, Germany, Latvia, Lithuania, Slovenia, Spain and The Netherlands, and Norway (Appendix Table TO2).

Tables describing monitoring programmes and diagnostic methods are presented in Appendix, Table TO1.

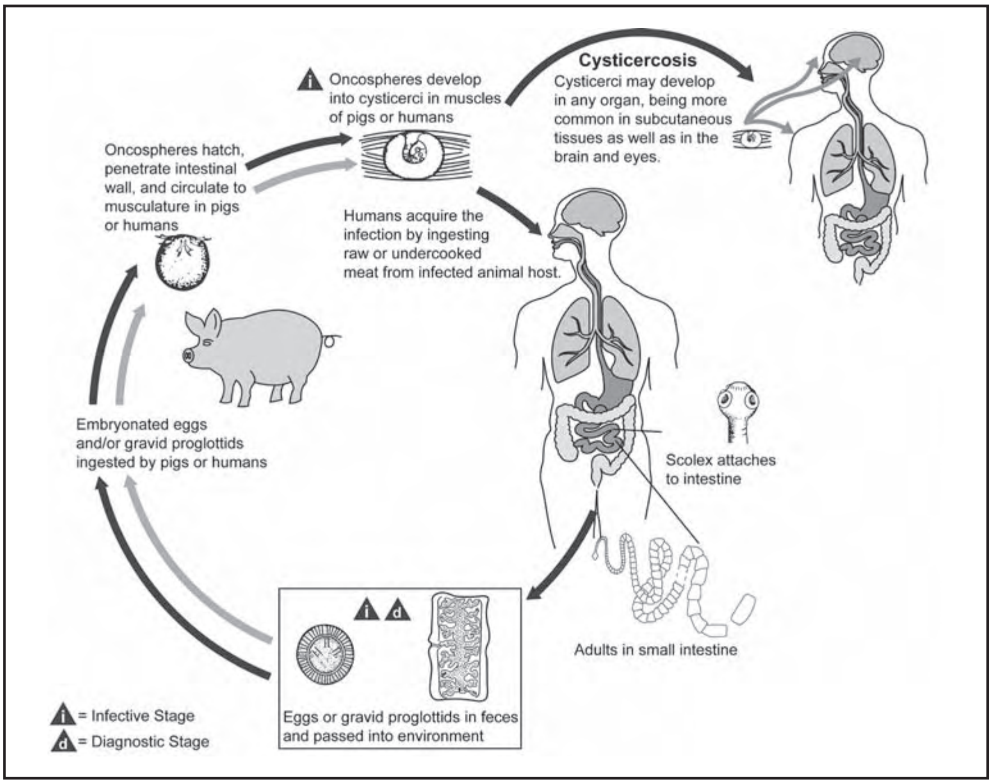
3.11. Other parasitic zoonoses reported

Belgium was the only MS to report on the following two zoonoses.

3.11.1. Cysticerci

Cysticercus infection in humans is caused by the larval form of the tapeworm *Taenia saginata*. Cattle become infected through the ingestion of contaminated vegetation, and the eggs develop into cysterci in the muscle of the animal. Humans may become infected through consumption of raw or undercooked contaminated meat. Symptoms are mild abdominal discomfort and effective drug treatments exist.

Figure OP1. Lifecycle of *Taenia saginata*



Source: Centers for Disease Control and Prevention – U.S.A. – http://www.dpd.cdc.gov/dpdx/

Belgium reported data on the presence of cysticercus observed at post-mortem visual inspection of bovine carcasses at slaughterhouses. In 2004, of the 881,535 carcasses screened, 3,002 tested positive. The majority (2,981) of carcasses were infected with low parasitic loads and were treated by freezing at –10°C for 10 days prior to human consumption. The remaining 21 carcasses were heavily contaminated. This is a decrease from the 3,886 contaminated carcasses (3,859 lightly, 25 heavily) from 2003.

3.11.2. Sarcocystis

Disease in humans may be caused by several species of *Sarcocystis* all of which have have a life cycle requiring two hosts. Humans become infected through the ingestion of infected meat or excreted oocysts and develop symptoms including diarrhoea, headache, as well, abortion and congenital disorders can result.

Belgium reported findings from post-mortem inspection of bovine carcasses at slaughterhouses for the presence of sarcosporidiosis lesions. In 2004, of the 881,535 carcasses screened, 19 tested positive for *Sarcocystis*. Infected carcasses were destroyed. This incidence of detection of this pathogen increased compared to 2003 where there were 14 cattle rejections in 2003, and only 5 in 2002.

3.12. Rabies

Rabies is a virus disease caused by a rhabdovirus of the genus *lyssavirus*. This virus can infect all warm-blooded animals and is transmitted through contact with infected animal saliva from animal bites. The disease causes swelling in the central nervous system of the host and is usually fatal. Two sub-types of rabies virus (lyssavirus genotypes 5 and 6), also known as European bat lyssavirus (EBL), are seen in bats. In rare cases, the infection can be transferred to mammals, including humans.

Symptoms in humans include a sense of apprehension, headache and fever and eventually leading to death of the affected person. Human cases are extremely rare in developed countries including EU, however, those working with bats and other wildlife are encouraged to seek advice on immunisation.

In animals, pathogenicity and infectivity of the disease vary greatly among different species. Infected animals may exhibit a wide range of symptoms, including drooling, difficulty swallowing, irritability, strange behaviour, alternating rage and apathy and increasing paralysis of lower jaw and hindparts. Animals may excrete the virus during the incubation period, prior to the onset of clinical symptoms.

3.12.1. Rabies in humans

Generally, very few rabies cases in humans are reported in EU. Since 2001, only five cases imported from outside of EU have been registered (Table RA1), and most MS have not had any indigenous cases for decades. In 2004, one person died in Austria after being bitten by a puppy in Morocco, and one imported human case was reported from Germany.

Table RA1. Human rabies cases in EU, 2001-2004

Year	Country	Case
2001	UK	1 visitor from Philippines
2002	UK	1 registered bat handler died from EBL1
2003	France	1 visitor from Gabon
2004	Austria	1 case imported from Morocco
	Germany	1 imported case

1. EBL = European Bat Lyssavirus.

3.12.2. Rabies in animals

In 2004, rabies was reported in various animal species by 12 MS: Austria, Estonia, France, Germany, Hungary, Latvia, Lithuania, Poland, Slovakia, Slovenia, Spain and The Netherlands (Table RA2). In Austria the virus isolated from a dead fox was not a wild rabies strain, but the vaccination strain. Estonia, Hungary, Latvia, Lithuania, Poland and Slovakia reported cases in farm animals, pets and wildlife. France reported European Bat Lyssavirus (EBL) in bats and rabies in 3 illegally imported dogs, The Netherlands reported EBL from bats and Spain reported rabies in one dog imported from Morocco. In Austria, the vaccination strain of the virus was isolated from one fox, not the wild rabies strain.

With the exception of Estonia, France, Spain and The Netherlands, all of these MS have implemented rabies eradication programmes in the wildlife population, focusing on foxes. Estonia and France will implement eradication programmes from 2005. Austria, Czech Republic, Finland (along the south eastern border), Germany, Latvia, Poland, Slovakia and Slovenia run programmes approved and co-financed by the European Commission (2003/849/EC). Furthermore, Hungary, Italy (Region Friuli Venezia Giulia) and Lithuania had similar types of eradication programmes in 2004 and Spain consider the mainland and islands free from rabies. See the Appendix Table RA1 for more information.

Table RA2. Reported rabies cases in animals, 2004

	Domestic animals[1]		Pet animals				Wildlife					
			Cats		Dogs		Bats		Foxes		Other	
	N	Positive	N	Positive	N	Positive	N	Positive	N	Positive	N	Positive
Austria	24	0	126	0	78	0	2	0	9,772	1[9]	1,229	0
Belgium	341	0	10	0	10	0	31	0	211	0	14	0
Cyprus	0	-	0	-	0	-	0	-	0	-	0	0
Czech Republic	20	0	421	0	286	0	21	0	8,186	0	357	0
Denmark	-	-	-	-	1	0	18	0	2	0	0	0
Estonia	85	15[3]	158	20	96	24	0	0	169	92	283	163
Finland	5	0	16	0	13	0	4	0	321	0	333	0
France	37	0	1,175	0	1,476	3[4]	223	4[2]	379	0	11	0
Germany	-	-	-	-	-	1	-	14	-	27	-	6
Greece	-	-	2	0	1,052	0	-	-	-	-	0	0
Hungary	140	3	643	5	431	6	5	0	4,758	111	168	0
Ireland	-	-	-	0	-	0	-	0	-	0	-	0
Italy	25	0	198	0	432	0	11	0	2,554	0	390	0
Latvia	74	26[5]	198	35	174	33	0	0	409	181	347	168
Lithuania	156	70[6]	271	34	287	41		-	609	197	541	211[7]
Luxembourg	3	0	8	0	1	0		-	26	0	2	0
Malta	-	-	-	0	-	0		0	-	0	-	0
Poland	233	8[3]	1,153	10	1,022	4	80	10	19,875	86	1,007	0
Portugal	-	-	-	-	-	-	-	-	40	0	0	0
Slovakia	22	1[8]	276	3	384	1	-	-	1,563	47	108	5
Slovenia	38	0	79	0	65	0	0	0	1,324	2	106	0
Spain	-	-	1,177	0	3,748	1[10]	-	-	-	-	0	0
Sweden	-	-	13	0	25	0	59	0	-	-	19	0
The Netherlands	-	-	2	0	4	0	91	14[2]	12	0	1	0
United Kingdom	-	-	11	0	11	0	-	-	-	-	0	0
EU-Total	**1,203**	**123**	**5,937**	**107**	**9,596**	**114**	**545**	**42**	**50,210**	**744**	**4,916**	**553**
Norway	-	-	-	-	1	0		-	36	0	3	0

1. Include cattle (75% of the samples), sheep (12%), horses (6%), goats, pigs and other.
2. European Bat Lyssavirus (EBL).
3. Cattle were positive.
4. In France, dogs imported illegally.
5. In Latvia, 25 cattle positive.
6. In Lithuania, 65 cattle and 5 solipeds positive.
7. In Lithuania, 161 raccoon dogs positive.
8. In Slovakia, 1 sheep positive.
9. In Austria, the vaccination strain of the virus was isolated from one fox, not the wild rabies strain. It is known that vaccination of a fox population can cause lethality in very young animals.
10. In Spain, a positive dog imported from Morocco.

Compulsory vaccination of carnivorous pets has been implemented in Belgium (in some regions), Czech Republic, Estonia, Greece, Hungary, Lithuania, Poland, Portugal, Slovakia and Slovenia. In Finland vaccination is recommended. See the Appendix, Tab le RA1 for more information.

At least since 1999, six of the EU-15 countries: Belgium, Finland, Greece, Ireland, Italy, Portugal and Sweden, and Norway (mainland) had no reports of rabies (Table RA3). Malta has been free from rabies since 1911.

Table RA3. Rabies in animals, 1999-2004

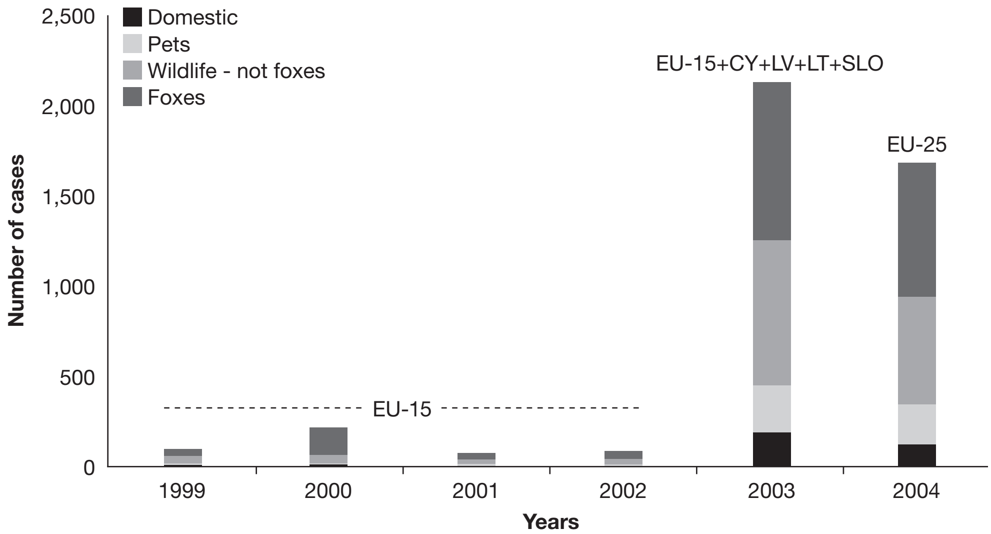
	2004			2003			2002			2001			2000			1999		
	Domestic	**Pets**	**Wildlife**	**Domestic**	**Pets**	**Wildlife**	**Domestic**	**Pets**	**Wildlife**	**Domestic**	**Pets**	**Wildlife**	**Domestic**	**Pets**	**Wildlife**	**Domestic**	**Pets**	**Wildlife**
Austria	0	0	+[7]	+	0	0	0	+	+	+[4]	-	-	0	0	+[4]	-	-	-
Belgium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyprus	-	-	-	0	0	0												
Czech Republic	0	0	0															
Denmark	-	0	0	0	0	-	+[3]	0	+[3]	-	-	+[3]	-	-	+[3]	-	-	+[3]
Estonia	+	+	+															
Finland	0	0	0	+[4]	0	0	0	0	0	0	0	0	0	0	0	0	0	0
France	0	+[4]	+[6]	-	-	-	0	+[4]	+[6]	0	+[4]	+[6]	0	0	+[6]	0	0	+[2]
Germany	-	+	+	+	-	+	-	+	+	+	+	+	+	+	+	+	+	+
Greece	-	0	-	-	0	0	-	-	-	0	0	0	-	-	-	-	0	0
Hungary	+	+	+															
Ireland	-	-	0	0	0	0	-	-	-	-	-	-	0	-	-	-	-	-
Italy	0	0	0	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Latvia	+	+	+	+	+	+												
Lithuania	+	+	+	+	+	+												
Luxembourg	0	0	0	-	0	0	0	0	0	0	0	0	-	-	-	+	0	0
Malta	-	-	-															
Norway	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	+[5]
Poland	+	+	+															
Portugal	-	-	0	-	0	0	-	-	0	-	-	-	-	-	0	-	-	0
Slovakia	+	+	+															
Slovenia	0	0	+	0	0	+												
Spain	-	+[1]	-	0	+[1]	0	+	+[1]	+	0	+[1]	0	-	+[1]	+	-	+[1]	+
Sweden	-	0	0	-	0	0	0	0	0	-	0	0	0	0	0	0	0	0
The Netherlands	-	0	+[6]	0	0	+	-	0	+	-	0	+	-	0	+	0	0	+
United Kingdom	-	0	-	0	0	0	0	0	+	0	0	0	0	-	-	0	0	0

+: Rabies cases registered.
0: Rabies cases not registered.
Blank: MS were not EU members at the time and therefore reported no data. Cyprus, Latvia, Lithuania and Slovenia reported on a voluntary basis in 2003.
1. In Spain, imported from North Africa.
2. In France, bat imported from Belgium.
3. In Denmark, all cases in bats and sheep were caused by EBL.
4. Imported animals.
5. In Norway, wild fox at the achipilago of Svalbard.
6. In France and The Netherlands, bats infected with EBL.
7. In Austria, the vaccination strain of the virus was isolated from one fox, not the wild rabies strain. It is known that vaccination of a fox population can cause lethality in very young animals.

Between 2002 and 2003, the number of reported cases of rabies in animals within the EU increased remarkably from 85 to 2,130 cases, mainly due to the cases reported by two new MS; Latvia and Lithuania. From 2003 to 2004 this number decreased to 1,683 cases (Figure RA1). The four new MS; Cyprus, Latvia, Lithuania and Slovenia reported on voluntary basis in 2003.

In 2004, the majority of the reported rabies cases (95%) were found in the EU-10 countries, especially in Estonia, Latvia and Lithuania, and here the cases are primarily observed in the wildlife population. Foxes alone represent 44% of the total positive animals (Figure RA1).

Figure RA1. Number of reported rabies cases in animals in EU, 1999-2004



> ***Surveys***
>
> A 3-year longitudinal study in bats started in England in 2004. Results will be available in 2007. Another study on bats is in progress in Scotland. In Norway, a survey investigating the occurrence of rabies in wildlife on Svalbard is ongoing.

For additional information on data provided on rabies in animals, please, refer to Level 3, Table RA1.

3.12.3. Summary on rabies

Very few human rabies cases are reported in the EU annually. Usually persons known or suspected to be infected are immediately treated with prophylactic vaccinations, which prevent the disease from developing.

In most MS, the reported cases in animals are very rare or have been absent for many years. In those countries where the wild carnivore population carries the infection, vaccination programmes to control the disease have proven effective. This highlights the importance of continuous vaccination of the wildlife population in high risk or endemic areas in order to eradicate rabies throughout EU and to avoid reintroduction of rabies from countries east of the EU. Furthermore, illegal import of animals into the rabies free zones of EU is a threat. Of note, the infected bat population forms a potential risk.

All MS with positive findings have eradication programmes in action or will start eradication programmes in 2005 (Estonia). In France, rabies in foxes was eradicated in the late 1980's after the implementation of eradication programmes and in Germany the number of rabies cases in foxes has decreased from 150 from an outbreak in 2000 to 27 in 2004.

The majority of rabies cases in animals were reported by the new MS, where wildlife (especially foxes) is frequently infected. These wild animals form a source of infection for farm animals, pets and humans. Latvia and Lithuania voluntarily reported number of rabies cases in 2003. These countries have an eradication programme for foxes, and both countries had a reduction in the relative number of positive cases in foxes in 2004 compared to 2003.

Eradication programme in Slovenia

Slovenia has had an eradication programme in place since the late 1980's. In foxes, the number rabies cases decreased from 996 in 1989 to 5 in 1999. However, in 2000 the number of cases increased mainly due to an increase in the number of cases of rabies along the south-eastern border and distribution of fewer vaccines. As a result, the number of cases had increased to135 in 2001. Therefore, the eradication strategy was altered to focus on distribution of vaccine containing baits along the south-eastern border of the country. A very encouraging result was obtained with only 15 positive cases in 2002, 8 in 2003 and 2 in 2004.

3.12.4. Sources of rabies data

In 2004, information concerning rabies was submitted from all MS and Norway.

Rabies is notifiable in humans in all MS and Norway. No information was provided by Luxembourg, Malta, Poland and Portugal. In most MS and Norway, examination of human cases is based on blood samples or cerebrospinal fluid. However, in case of post mortem examinations the central nervous system is sampled. Identification is mostly based on antigen detection, isolation of virus and the mouse inoculation test. See Appendix, Table RA3 for more information.

In accordance with Council Directive 64/432/EEC, rabies is notifiable in animals in all MS and Norway; in The Netherlands only in dogs. No information on notification was provided by Ireland, Luxembourg and Malta.

Belgium, Finland, France, Ireland, Luxembourg, Norway (mainland) and United Kingdom have been appointed officially free from rabies (ORF) by the OIE or WHO. Sweden is free from rabies, but is not declared ORF. Cyprus, Greece, Malta and Spain (mainland and islands) consider themselves free from rabies. See Appendix, Table RA3 for more information.

In animals, most MS and Norway examine clinically suspect animals by testing samples of the central nervous system. Identification is mostly carried out using the fluorescent antibody test (FAT), which is recommended by both WHO[1] and OIE[2]. and the mouse inoculation test. However, ELISA, PCR and histology are also used. France, Greece, Ireland, Luxembourg, Portugal, Slovenia and The Netherlands provided no information on the diagnostics used. See Appendix, Table RA2 for more information.

[1] WHO Laboratory techniques in rabies.

[2] O.I.E. Manual of Diagnostic Tests and Vaccines for Terrestrial Animals.

4. INFORMATION ON ANTIMICROBIAL RESISTANCE IN SPECIFIC INDICATORS

4.1. E. coli indicators

4.1.1. E. coli indicators in food

Data on antimicrobial resistance in E. *coli indicators* from bovine meat (Table AB EC1), from pig meat (Table AB EC2), and from broiler meat (Table AB EC3) was provided by Denmark, Latvia and The Netherlands. Norway provided data on antimicrobial resistance in pig meat and broiler meat. In general, these four countries reported low levels of antimicrobial resistance in food.

4.1.2. E. coli indicators in animals

Data on the occurrence of antimicrobial resistance in *E. coli* indicators from animals (cattle, pigs, *Gallus gallus*) was provided by the following countries; Austria, Czech Republic, Denmark, Estonia, Finland, France, Greece, Hungary, Ireland, Italy, Latvia, Norway, Poland, Portugal, Spain, Sweden, The Netherlands and United Kingdom (Table AB EC4-EC6).

In general, a large variation in the prevalence of resistance in *E. coli* indicator isolates was observed among the data providing countries. This variation was especially large for penicillins, quinolones and tetracyclines, whereas in general, less variation was seen in the prevalence of resistance to the other antimicrobials tested. In general, the highest prevalence was reported in isolates from *Gallus gallus*, followed by pigs and cattle.

Table AB EC1. Antimicrobial resistance in *E. coli* indicators from bovine meat, 2004

	Country		DK	LV	NL
	Monitoring program		yes	no	yes
	No of isolates available		196	3	66
Antimicrobial Group	Antimicrobial				
Aminoglycosides	Gentamicin	N	196	2	66
		R%	0	0	0
	Streptomycin	N	196	2	-
		R%	9	0	-
Amphenicols	Chloramphenicol	N	196	2	66
		R%	1	0	5
Cephalosporins	Cefotaxim	N	-	3	66
		R%	-	0	2
	Cephalothin	N	196	-	-
		R%	5	-	-
Fluoroquinolones	Ciprofloxacin	N	196	3	66
		R%	2	0	0
Penicillins	Ampicillin	N	196	2	66
		R%	8	0	15
Quinolones	Nalidixic acid	N	196	1	66
		R%	0	0	2
Sulfonamides	Sulfonamide	N	196	-	-
		R%	7	-	-
Tetracyclines	Tetracycline	N	196	2	66
		R%	9	0	27
Trimethoprim	Trimethoprim	N	196	-	66
		R%	4	-	12
Trimethoprim + Sulfonamides	Trimethoprim + Sulfonamide	N	-	-	66
		R%	-	-	12
Multiresistant isolates	fully sensitives	%	-	100	-
	resistant to 1 antimicrobial	%	-	0	-
	resistant to 2 antimicrobials	%	-	0	-
	resistant to 3 antimicrobials	%	-	0	-
	resistant to 4 antimicrobials	%	-	0	-
	resistant to >4 antimicrobials	%	-	0	-

Note: Only selected antimicrobials are presented in the table. The percentage of multiresistant isolates is based on all antimicrobials tested. Tables containing results for all antimicrobials tested can be found in Level 3.

Table AB EC2. Antimicrobial resistance in *E. coli* indicators from pig meat, 2004

	Country		DK	LV	N	NL
	Monitoring program		yes	no	yes	yes
	No of isolates available		178	8	97	24
Antimicrobial Group	Antimicrobial					
Aminoglycosides	Gentamicin	N	178	2	97	24
		%R	0	0	0	0
	Streptomycin	N	178	9	97	-
		%R	28	33	19.6	-
Amphenicols	Chloramphenicol	N	178	13	97	24
		%R	2	15	1	8
Cephalosporins	Cefotaxim	N	-	13	-	24
		%R	-	0	-	0
	Ceftiofur	N	178	-	97	-
		%R	0	-	0	-
Fluoroquinolones	Ciprofloxacin	N	178	11	-	24
		%R	0	9	-	0
	Enrofloxacin	N	-	-	97	-
		%R	-	-	0	-
Penicillins	Ampicillin	N	178	11	97	24
		%R	15	27	9.3	21
Quinolones	Nalidixic acid	N	178	3	97	24
		%R	2	0	0	0
Sulfonamides	Sulfonamide	N	178	-	97	24
		%R	18	-	11.3	29
Tetracyclines	Tetracycline	N	178	9	97	24
		%R	26	11	8.3	42
Trimethoprim	Trimethoprim	N	178	3	97	24
		%R	10	0	7.2	21
Trimethoprim + Sulfonamides	Trimethoprim + Sulfonamide	N	-	3	-	24
		%R	-	0	-	29
Multiresistant isolates	fully sensitives	%	-	62	77.3	-
	resistant to 1 antimicrobial	%	-	23	9.3	-
	resistant to 2 antimicrobials	%	-	-	3.1	-
	resistant to 3 antimicrobials	%	-	8	3.1	-
	resistant to 4 antimicrobials	%	-	-	3.1	-
	resistant to >4 antimicrobials	%	-	8	4.1	-

Note: Only selected antimicrobials are presented in the table. The percentage of multiresistant isolates is based on all antimicrobials tested. Tables containing results for all antimicrobials tested can be found in Level 3.

Table AB EC3. Antimicrobial resistance in *E. coli* indicators from poultry meat, 2004

	Country		DK	LV	N	NL
	Monitoring program		yes	no	yes	yes
	No of isolates available		216	8	87	144
Antimicrobial Group	Antimicrobial					
Aminoglycosides	Gentamicin	N	216	5	87	144
		%R	0	0	0	3
	Streptomycin	N	216	4	87	-
		%R	6	75	16.1	-
Amphenicols	Chloramphenicol	N	216	5	87	144
		%R	1	40	0	9
Cephalosporins	Cefotaxim	N	-	7	-	144
		%R	-	14	-	2
Fluoroquinolones	Ciprofloxacin	N	216	7	-	144
		%R	6	14	-	4
	Enrofloxacin	N	-	-	87	-
		%R	-	-	3.4	-
Penicillins	Ampicillin	N	216	5	87	144
		%R	15	100	23.3	58
Quinolones	Nalidixic acid	N	216	4	87	144
		%R	6	50	3.4	22
Sulfonamides	Sulfonamide	N	216	-	87	-
		%R	15	-	12.6	-
Tetracyclines	Tetracycline	N	216	4	87	144
		%R	9	50	6.9	48
Trimethoprim	Trimethoprim	N	216	4	87	144
		%R	3	75	2.3	47
Trimethoprim + Sulfonamides	Trimethoprim + Sulfonamides	N	-	4	-	144
		%R	-	75	-	44
Multiresistant isolates	fully sensitives	%	-	13	58.6	-
	resistant to 1 antimicrobial	%	-	-	29.9	-
	resistant to 2 antimicrobials	%	-	25	8.1	-
	resistant to 3 antimicrobials	%	-	13	1.2	-
	resistant to 4 antimicrobials	%	-	50	0	-
	resistant to >4 antimicrobials	%	-	-	2.3	-

Note: Only selected antimicrobials are presented in the table. The percentage of multiresistant isolates is based on all antimicrobials tested. Tables containing results for all antimicrobials tested can be found in Level 3.

Table AB EC4. Antimicrobial resistance in *E. coli* indicators from cattle, 2004

	Country		**A**	**CZ**	**DK**	**F**	**GR**	**H**
	Monitoring program		yes	yes	yes	yes	no	yes
	No of isolates available		212	51	97	308	3	263
Antimicrobial Group	Antimicrobial							
Aminoglycosides	Gentamicin	N	212	50	97	301	3	263
		%R	0	6	0	5	0	0.4
	Streptomycin	N	212	50	97	306	3	263
		%R	3.3	60	18	38.6	33.3	3.4
Amphenicols	Chloramphenicol	N	212	50	97	301	3	263
		%R	0	8	0	17.6	33.3	0.4
Cephalosporins	Cefotaxim	N	-	-	-	-	-	-
		%R	-	-	-	-	-	-
	Cephalothin	N	212	-	97	-	-	263
		%R	0.9	-	1	-	-	5.3
Fluoroquinolones	Ciprofloxacin	N	212	-	97	302	3	-
		%R	0	-	0	3.3	0	-
	Enrofloxacin	N	-	51	-	-	1	263
		%R	-	15.7	-	-	0	0
Penicillins	Ampicillin	N	212	51	97	298	3	263
		%R	1.9	13.7	8	27.5	33.3	5.7
Quinolones	Nalidixic acid	N	212	-	97	305	3	263
		%R	0.9	-	0	9.8	0	0.4
Sulfonamides	Sulfonamide	N	212	-	97	-	3	263
		%R	2,4	-	14.0	-	66.7	5.3
Tetracyclines	Tetracycline	N	212	50	97	303	3	263
		%R	5.2	60	12	41.6	33.3	13.3
Trimethoprim	Trimethoprim	N	212	-	-	296	3	0
		%R	0.9	-	3	20.9	66.7	-
Trimethoprim + Sulfonamides	Trimethoprim + Sulfonamide	N	-	51	-	-	3	263
		%R	-	15.7	-	-	66.7	1.9
Multiresistant isolates	fully sensitives	%	91.5	-	-	54.9	33.3	82.1
	resistant to 1 antimicrobial	%	4.7	-	-	5.8	-	10.6
	resistant to 2 antimicrobials	%	0.5	-	-	8.8	-	2.3
	resistant to 3 antimicrobials	%	0.9	-	-	3.9	33.3	2.3
	resistant to 4 antimicrobials	%	1.9	-	-	7.8	-	1.5
	resistant to >4 antimicrobials	%	0.5	-	-	18.8	33.3	1.1

Table AB EC4. Antimicrobial resistance in *E. coli* indicators from cattle, 2004 (cntd)

	Country		IRL	I	LV	PL	P	UK
	Monitoring program		no	yes	no	yes		no
	No of isolates available		29,603	471	20	234	43	1,303
Antimicrobial Group	Antimicrobial							
Aminoglycosides	Gentamicin	N	-	471	18	181	-	1,303
		%R	-	4.2	6	1.1	-	0.5
	Streptomycin	N	481	471	14	184	-	1,303
		%R	72.1	21.9	36	6.0	-	2
Amphenicols	Chloramphenicol	N	-	471	8	181	1	1,303
		%R	-	10.8	25	0	0	0.5
Cephalosporins	Cefotaxim	N	-	471	7	-	1	1,015
		%R	-	0.4	0	-	0	0
	Cephalothin	N	1,241	-	-	-	-	-
		%R	49.3	-	-	-	-	-
Fluoroquinolones	Ciprofloxacin	N	-	-	16	183	1	-
		%R	-	-	0	0	0	-
	Enrofloxacin	N	3,075	471	-	184	-	3,576
		%R	26.5	6.4	-	0	-	0
Penicillins	Ampicillin	N	1,777	471	16	184	-	-
		%R	76.6	18.0	19	7.1	-	-
Quinolones	Nalidixic acid	N	-	471	8	184	-	1,303
		%R	-	13.0	0	1.1	-	0.5
Sulfonamides	Sulfonamide	N	-	157	-	181	-	1,303
		%R	-	27.4	-	5.0	-	4.0
Tetracyclines	Tetracycline	N	1,374	471	8	182	1	-
		%R	77.4	32.3	38	9.9	100	-
Trimethoprim	Trimethoprim	N	365	264	4	184	-	-
		%R	78.9	17.4	50	3.8	-	-
Trimethoprim + Sulfonamides	Trimethoprim + Sulfonamide	N	2,819	157	5	184	-	-
		%R	60.9	14.6	0	3.8	-	-
Multiresistant isolates	fully sensitives	%	-	62.0	65	84.2	-	92
	resistant to 1 antimicrobial	%	-	5.0	10	7.6	-	3
	resistant to 2 antimicrobials	%	-	5.5	-	3.3	-	3
	resistant to 3 antimicrobials	%	-	5.3	15	2.7	-	1
	resistant to 4 antimicrobials	%	-	4.2	-	1.1	-	1
	resistant to >4 antimicrobials	%	-	16.3	10	1.1	-	0

Note: Only selected antimicrobials are presented in the table. The percentage of multiresistant isolates is based on all antimicrobials tested. Tables containing results for all antimicrobials tested can be found in Level 3.

Table AB EC5. Antimicrobial resistance in *E. coli* indicators from pigs, 2004

	Country		A	CZ	DK	EST	FIN	F	H	IRL
	Monitoring program		yes	yes	yes	yes	yes	yes	yes	no
	No of isolates available		217	175	208	9	391	101	171	649
Antimicrobial Group	Antimicrobial									
Aminoglycosides	Gentamicin	N	217	175	208	9	391	98	171	-
		%R	0.9	9.71	3	22.2	0	3.1	0.6	-
	Streptomycin	N	217	175	208	9	391	100	171	5
		%R	54.4	54.3	48	77.8	14.6	67	29.8	100
Amphenicols	Chloramphenicol	N	217	175	208	9	391	98	171	-
		%R	3.7	14.3	9	33.3	1.3	21.4	8.7	-
Cephalosporins	Cefotaxim	N	-	-	-	9	-	-	-	-
		%R	-	-	-	0	-	-	-	-
	Cephalothin	N	217	-	208	-	-	-	171	5
		%R	0.5	-	5	-	-	-	8.2	80
Fluoroquinolones	Ciprofloxacin	N	217	-	208	9	-	101	0	-
		%R	0.9	-	3	0	-	0	-	-
	Enrofloxacin	N	-	175	-	9	391	-	171	78
		%R	-	19.4	-	0	0.8	-	0.6	19.2
Penicillins	Ampicillin	N	217	175	208	9	391	98	171	61
		%R	6	2.9	33	22.2	6.1	26.5	23.4	82
Quinolones	Nalidixic acid	N	217	-	208	9	391	99	171	-
		%R	2.3	-	3	33.3	0.8	7.1	1.2	-
Sulfonamides	Sulfonamide	N	217	-	208	9	391	-	171	-
		%R	30	-	47	66.7	11.5	-	27.5	-
Tetracyclines	Tetracycline	N	217	175	208	-	391	101	171	11
		%R	58.1	63.4	44	55.6	16.4	81.2	74.2	81.8
Trimethoprim	Trimethoprim	N	217	-	208	9	391	100	0	1
		%R	8.8	-	21	55.6	7.7	48	-	100
Trimethoprim + Sulfonamides	Trimethoprim + Sulfonamide	N	-	175	-	9	-	-	171	77
		%R	-	19.4	-	55.6	-	-	9.3	83.1
Multiresistant isolates	fully sensitives	%	28.1	-	-	11	71.4	15.8	18.7	-
	resistant to 1 antimicrobial	%	12.9	-	-	11	14.8	6.9	38.6	-
	resistant to 2 antimicrobials	%	18	-	-	0	5.4	23.8	13.5	-
	resistant to 3 antimicrobials	%	18.4	-	-	11	3.1	22.8	11.1	-
	resistant to 4 antimicrobials	%	13.8	-	-	-	3.1	12.9	5.8	-
	resistant to >4 antimicrobials	%	8.8	-	-	67	2.3	17.8	12.3	-

Table AB EC5. Antimicrobial resistance in *E. coli* indicators from pigs, 2004 (cntd)

	Country		I	LV	N	PL	P	ES	NL	UK
	Monitoring program		yes	no	yes	yes		no	yes	no
	No of isolates available		180	39	125	310	10	183	300	1,037
Antimicrobial Group	Antimicrobial									
Aminoglycosides	Gentamicin	N	166	30	125	273	10	183	300	1,037
		%R	1.1	10	0	0.4	10	7.7	0	0.5
	Streptomycin	N	166	28	125	272	10	183	-	1,037
		%R	49.4	71	33.6	36	100	66.1	-	28
Amphenicols	Chloramphenicol	N	166	3	125	278	-	183	300	1,037
		%R	29.0	0	0.8	1.8	-	30.6	12	22
Cephalosporins	Cefotaxim	N	166	11	-	-	10	183	300	807
		%R	0	18	-	-	10	0.5	0	0
	Cephalothin	N	-	-	-	-	-	-	-	-
		%R	-	-	-	-	-	-	-	-
Fluoroquinolones	Ciprofloxacin	N	-	37	-	277	-	183	300	-
		%R	-	0	-	0.4	-	3.3	0	-
	Enrofloxacin	N	166	-	125	277	10	-	-	313
		%R	4.8	-	0	0.4	10	-	-	2
Penicillins	Ampicillin	N	166	35	125	278	10	183	300	-
		%R	54.3	74	8.0	10.4	100	69.9	25	-
Quinolones	Nalidixic acid	N	166	24	125	277	10	183	300	1,037
		%R	6.6	13	0	4.0	10	20.8	0	1
Sulfonamides	Sulfonamide	N	80	-	125	278	-	183	300	1,037
		%R	78.8	-	12.0	15.8	-	73.2	53	62
Tetracyclines	Tetracycline	N	166	25	125	272	10	183	300	-
		%R	80.7	72	9.6	34.6	90	95.6	64	-
Trimethoprim	Trimethoprim	N	86	4	125	276	10	183	300	-
		%R	29.7	75	4.0	6.9	90	66.7	43	-
Trimethoprim + Sulfonamides	Trimethoprim + Sulfonamide	N	80	3	-	276	-	-	-	-
		%R	67.5	67	-	6.7	-	-	-	-
Multiresistant isolates	fully sensitives	%	15.1	8	60.0	53.6	-	2.7	10	14
	resistant to 1 antimicrobial	%	8.4	18	20.0	17.3	-	3.8	9.3	17
	resistant to 2 antimicrobials	%	7.8	15	14.4	18.4	-	7.1	8	14
	resistant to 3 antimicrobials	%	12.7	26	3.2	2.5	-	12.6	13	19
	resistant to 4 antimicrobials	%	14.5	21	1.6	7.2	-	24	21.7	15
	resistant to >4 antimicrobials	%	41.5	13	0.8	1.1	-	49.7	38	-

Note: Only selected antimicrobials are presented in the table. The percentage of multiresistant isolates is based on all antimicrobials tested. Tables containing results for all antimicrobials tested can be found in Level 3.

Table AB EC6. Antimicrobial resistance in *E. coli* indicators from *Gallus gallus*, 2004

	Country		A[1]	DK	EST	F	GR	H	IRL	I
	Monitoring program		yes	yes	yes	yes	no	yes	no	yes
	No of isolates available		216	142	1	102	52	147	826	471
Antimicrobial Group	Antimicrobial									
Aminoglycosides	Gentamicin	N	216	142	1	100	52	147	-	156
		%R	2.3	0	0	5	1.9	0	-	1.28
	Streptomycin	N	216	142	1	101	52	147	25	156
		%R	30.6	8	0	36.6	59.6	24.5	80	35.9
Amphenicols	Chloramphenicol	N	216	142	1	101	52	147	-	156
		%R	4.6	0	0	6.9	17.3	7.5	-	17.3
Cephalosporins	Cephalothin	N	216	142	-	-	-	147	25	-
		%R	2.3	2	-	-	-	18.4	92	-
Fluoroquinolones	Ciprofloxacin	N	216	142	1	100	52	-	-	-
		%R	3.2	12	0	0	11.5	-	-	-
	Enrofloxacin	N	-	-	1	-	12	147	81	156
		%R	-	-	0	-	25	24.5	4.9	10.3
Penicillins	Ampicillin	N	216	142	1	101	51	147	56	156
		%R	23.6	18	0	33.7	57.0	42.2	89.3	53.2
Quinolones	Nalidixic acid	N	216	142	1	102	52	147	-	156
		%R	41.2	13	0	22.5	63.5	71.4	-	42.3
Sulfonamides	Sulfonamide	N	216	142	1	-	52	147	-	82
		%R	31.0	18	0	-	71.1	34.7	-	42.7
Tetracyclines	Tetracycline	N	216	142	1	99	51	147	18	156
		%R	35.2	11	0	77.8	90	42.9	38.9	74.3
Trimethoprim	Trimethoprim	N	216	-	1	99	46	-	3	74.0
		%R	14.4	5	0	25.3	56.5	-	100	32.4
Trimethoprim + Sulfonamides	Trimethoprim + Sulfonamide	N		-	1	-	52	147	78	82
		%R		-	0	-	55.7	21.8	48.7	36.6
Multiresistant isolates	fully sensitives	%	26.9	-	100	18.6	-	11.6	-	16.0
	resistant to 1 antimicrobial	%	24.1	-	0	25.5	17.3	23.1	-	10.3
	resistant to 2 antimicrobials	%	17.1	-	0	15.7	7.7	18.4	-	12.8
	resistant to 3 antimicrobials	%	8.8	-	0	13.7	5.8	17.7	-	17.3
	resistant to 4 antimicrobials	%	8.8	-	0	14.7	17.3	11.6	-	10.4
	resistant to >4 antimicrobials	%	14.4	-	0	11.8	51.9	17.7	-	32.1

1. 216 isolates: 211 isolates from Gallus gallus and 5 isolates from turkey.

Table AB EC6. Antimicrobial resistance in *E. coli* indicators from *Gallus gallus*, 2004 (cntd)

	Country		LV	N	PL	P	ES	S	NL	UK
	Monitoring program		no	yes	yes		no	yes	yes	no
	No of isolates available		13	86	106	32	152	300	296	177
Antimicrobial Group	Antimicrobial									
Aminoglycosides	Gentamicin	N	13	86	88	6	152	300	296	-
		%R	15	0	9.1	16.7	8.6	0	4	-
	Streptomycin	N	11	86	93	6	152	300	-	-
		%R	55	9.3	63.4	33.3	57.9	4.9	-	-
Amphenicols	Chloramphenicol	N	4	86	88	6	152	300	296	-
		%R	25	0	17.1	100	18.4	0	23	-
Cephalosporins	Cephalothin	N	-	-	-	-	-	-	-	-
		%R	-	-	-	-	-	-	-	-
Fluoroquinolones	Ciprofloxacin	N	12	-	93	6	152	-	296	-
		%R	33	-	37.6	50	25.7	-	0	-
	Enrofloxacin	N	-	86	95	-	-	300	-	176
		%R	-	0	44.7	-	-	2.3	-	6
Penicillins	Ampicillin	N	9	86	93	-	152	300	296	177
		%R	89	17.4	71.0	-	57.2	4	63	37
Quinolones	Nalidixic acid	N	6	86	93	23	152	300	296	-
		%R	33	0	81.7	83	78.3	5	46	-
Sulfonamides	Sulfonamide	N	-	86	93	-	152	300	296	-
		%R	-	14	44.1	-	57.2	9	73	-
Tetracyclines	Tetracycline	N	2	86	93	6	152	300	296	177
		%R	50	7	62.4	83.3	76.3	6	67	65
Trimethoprim	Trimethoprim	N	-	86	94	-	152	300	296	-
		%R	-	2.3	24.5	-	34.9	0.3	63	-
Trimethoprim + Sulfonamides	Trimethoprim + Sulfonamide	N	1	-	94	6	-	-	-	176
		%R	0	-	24.5	66.7	-	-	-	28
Multiresistant isolates	fully sensitives	%	31	65.1	19.4	-	7.9	85.3	26.7	-
	resistant to 1 antimicrobial	%	15	24.4	1.1	-	9.9	6.7	19.3	-
	resistant to 2 antimicrobials	%	8	8.1	12.9	-	9.2	2.7	13.9	-
	resistant to 3 antimicrobials	%	31	1.2	15.1	-	7.9	1.7	15.5	-
	resistant to 4 antimicrobials	%	-	0	22.6	33.3	11.8	1.3	16.6	-
	resistant to >4 antimicrobials	%	15	1.2	29.0	66.7	53.3	2.3	8.1	14

Note: Only selected antimicrobials are presented in the table. The percentage of multiresistant isolates is based on all antimicrobials tested. Tables containing results for all antimicrobials tested can be found in Level 3.

Cattle

For *E. coli* indicator isolates from cattle reported by Austria, Czech Republic, Denmark, France, Greece, Hungary, Ireland, Italy, Latvia, Poland, Portugal and United Kingdom (Table AB EC4), the highest level of resistance was reported for tetracyclines (with few exceptions), whereas the level of resistance to the other antimicrobials tested was generally moderate or low. The reporting from Austria, Greece, Latvia and Portugal was based on relatively small numbers of isolates. Ireland reported a high prevalence of resistance to several antimicrobials, e.g. ampicillin (77%), macrolides (87%) and tetracycline (77%). The other countries reported moderate or low occurrence of resistance to these antimicrobials. Austria, Hungary, Poland and United Kingdom reported high proportions of fully susceptible *E. coli* isolates.

Pigs

For *E. coli* indicator isolates from pigs reported by Austria, Czech Republic, Denmark, Estonia, Finland, France, Hungary, Ireland, Italy, Latvia, Norway, Poland, Portugal, Spain, The Netherlands and United Kingdom (Table AB EC5), the highest level of resistance was reported for tetracyclines, although large variation was observed (ranging from 9.6% for Norway up to 95.6% for Spain). For Italy, Spain and United Kingdom high prevalence of resistance to sulfonamides (62-79%) was reported. Resistance to quinolones was generally at a low level, with the exception of Spain and Estonia reporting 20.8% and 33.3% respectively, however the reporting from Estonia was based on a small number of samples.

Gallus gallus

The occurrence of antimicrobial resistance in *E. coli* indicator isolates from *Gallus gallus* was reported by Austria, Denmark, Estonia, France, Greece, Hungary, Ireland, Italy, Latvia, Norway, Poland, Portugal, Spain, Sweden, The Netherlands and United Kingdom (Table AB EC6). The reporting from Estonia, Latvia and Portugal was based on a small number of isolates. In general, a large variation in the prevalence was seen among the reporting countries. A high level of resistance to ampicillin, tetracycline and quinolones was observed in several of the reporting countries. Denmark, Norway and Sweden reported a generally low prevalence of resistance, with Sweden and Norway reporting high proportions of fully susceptible isolates (85% and 65% respectively). With few exceptions, low levels of fluoroquinolones resistance were reported.

4.1.3. Summary on E. coli indicators

The reporting of antimicrobial resistance in *E. coli* indicators from the MS and Norway, clearly demonstrates the presence of a reservoir of resistant bacteria in food animals and food of animal origin. Subsequent emergence of infections in humans, caused by resistant bacteria originating from the animal reservoir, is of concern as effective treatment may be compromised. The large differences between countries in the occurrence of resistance to penicillins, quinolones and tetracyclines in *E. coli* indicators, may likely be attributed to differences in antimicrobial consumption in food animals in the countries, and to differences in policies of antimicrobial use.

4.1.4. Sources of E. coli indicators data

Data on the occurrence of antimicrobial resistance in *E. coli* indicators was provided by the following countries: Austria, Czech Republic, Denmark, Estonia, Finland, France, Greece, Hungary, Ireland, Italy, Latvia, Norway, Poland, Portugal, Spain, Sweden, The Netherlands and United Kingdom. The countries reported results of antimicrobial susceptibility testing of isolates of *E. coli* indicators from various animal species and from various foods. All countries provided data on the occurrence of antimicrobial resistance in isolates from one or more of the following animal species: cattle, pigs and *Gallus gallus*. Denmark, Latvia, Norway and The Netherlands further provided data on the occurrence of antimicrobial resistance in isolates from one or more of the following food categories: bovine meat, pig meat and poultry meat.

Results were requested for the Community Zoonoses Report as the percentage of resistant isolates, out of the total number of isolates tested against each antimicrobial for each bacterial species in each specific sample category. In contrast to previous years, countries were not confined to report on a defined panel of antimicrobials or specific sample categories. This has implied large heterogeneity of data on antimicrobial resistance reported for 2004. In order to preserve comparability of data between countries, categories in which several countries reported were selected for this summary. Furthermore, categories were selected based on their relative importance. Direct comparison of the prevalence of resistant isolates between countries is not made if the reporting is based on small numbers of isolates.

All countries providing data on antimicrobial resistance in *E. coli* indicators in 2004 generated the data through monitoring programmes. The majority of reporting countries used dilution (MIC) method for antimicrobial susceptibility testing of *E. coli* isolates. Exceptions were Hungary, Italy, Latvia, Poland and United Kingdom using disc diffusion method. Breakpoints applied in individual countries for antimicrobial susceptibility testing by dilution methods are presented in Level 3, Table AB EC9.

For additional data on antimicrobial resistance in *E. coli* indicators in humans, food and animals, please refer to Level 3, Tables AB EC1 to EC8.

5. FOODBORNE OUTBREAKS

5.1. General outbreak overview

In 2004, 20 MS and Norway reported 6,883 foodborne outbreaks affecting all together more than 44,000 people (Table OUT1). In the MS, these outbreaks resulted in 4,361 hospitalisations and 13 deaths. Outbreaks are reported as either General Outbreaks, affecting members of more than one private household, or Family Outbreaks, affecting only members of a single household. In 2004, there were 3,798 General Outbreaks and 3,062 Family Outbreaks. Germany and Sweden do not distinguish between General and Family Outbreaks. The United Kingdom and Poland only reported General Outbreaks. Poland only reported outbreaks with more than four persons ill.

Czech Republic and Germany reported the largest number of outbreaks, 2,334 and 2,647 respectively, representing 72.6% of all outbreaks reported for 2004. The EU reporting rate was 1.50 per 100,000 population and ranged from 0.09 in the United Kingdom to 22.86 in Czech Republic. All foodborne outbreak data is presented in Level 3, Table OUT1.

Table OUT1. Number of reported foodborne outbreaks in EU Member States and Norway, 2004

	Total number of out-breaks	Percent of total outbreaks reported in EU	Number of general out-breaks	Number of family out-breaks	Percent of out-breaks with aetiology[1]	Number of people affected	Number of people hospita-lised	Number of deaths	Report-ing rate per 100,000 for 2004
Austria	539	8.4	58	481	100	1,777	224	1	6.66
Belgium	55	0.8	33	22	78	530	74	0	0.53
Czech Republic	2,334	34.2	94	2,240	100	8,057	1,017	0	22.86
Denmark	53	0.8	31	22	81	147	0	0	0.98
Estonia	1	0.0	1	0	100	10	2	0	0.07
Finland	48	0.7	47	1	52	1,271	24	0	0.92
Germany[2]	2,647	38.8	2,647		100	10,851	0	0	3.21
Greece	39	0.6	23	16	92	1,737	442	1	0.35
Hungary	29	0.4	29	0	100	746	42	0	0.29
Ireland	13	0.2	7	6	77	71	6	0	0.32
Latvia	65	1.0	10	55	65	363	0	0	2.80
Lithuania	40	0.6	13	27	100	376	198	1	1.16
Poland	345	5.1	345		74	5,812	1,528	1	0.90
Portugal	20	0.3	9	11	100	181	61	0	0.19
Slovakia	42	0.6	30	12	100	1,013	0	0	0.78
Slovenia	64	0.9	51	13	98	1,871	196	0	3.21
Spain	338	4.8	195	143	100	4,593	433	8	0.78
Sweden[2]	86	1.3	86	0	40	1,318	1	0	0.96
The Netherlands	27	0.4	21	6	100	277	11	0	0.17
United Kingdom	52	0.8	52		100	1,903	102	1	0.09
EU-Total	**6,860**	**100**	**3,798**	**3,062**	**97**	**42,904**	**4,361**	**13**	**1.50**
Norway	23	0.3	16	7	100	1,573	8	0	0.50

1. Percent of outbreaks where the causative agent has been identified and reported.
2. No distinction between general outbreaks and family outbreaks.

Causative agents

The most common agent responsible for foodborne disease outbreaks was *Salmonella*, which was responsible for 73.9% (5,067) of all reported outbreaks (Table OUT2).

In 2004, the causative agent was unknown in 3.2% (217) of outbreaks. This proportion was higher for general outbreaks than for family outbreaks. Some MS did not report information on outbreaks where the causative agent was unknown.

Table OUT2. Causative agents responsible for foodborne outbreaks showing number of outbreaks and number of persons affected, 2004[1]

	Total number of outbreaks	Percent of total number of outbreaks	Number of general outbreaks[1]	Number of family outbreaks	Number of people affected	Number of people hospitalised
Bacillus spp.	6	0.1	5	1	96	0
Brucella spp.	3	<0.1	0	3	35	1
Campylobacter spp.	1,243	18.1	600	643	3,749	157
Clostridium spp.	18	0.3	11	7	650	17
Diphyllobothrium spp.	1	<0.1	0	1	2	0
Food borne viruses	86	1.3	86	0	3,010	146
Giardia	1	<0.1	1	0	1,300	0
Histamine	6	0.1	6	0	39	2
Lectin	1	<0.1	1	0	12	1
Leptospira spp.	1	<0.1	0	1	2	0
Marine biotoxins	1	<0.1	1	0	12	0
Pathogenic *Escherichia coli*	87	1.3	61	26	799	54
Salmonella spp.	5,067	73.9	2,756	2,311	30,638	3,304
Scrombrotoxin	1	<0.1	1	0	8	1
Shigella spp.	20	0.3	8	12	288	50
Staphylococcus spp.	35	0.5	28	7	778	14
Trichinella spp.	15	0.2	5	10	196	145
Yersinia spp.	51	0.7	39	12	182	5
Unknown	217	3.2	189	28	2,681	472
EU-Total	**6,860**	**100**	**3,798**	**3,062**	**44,477**	**4,369**

1. Including all outbreaks from Germany and Sweden with no distinction on type (general or family outbreak).

5.2. Foodborne outbreaks caused by Salmonella spp.

Outbreaks of salmonellosis were reported by 20 MS and Norway. Outbreaks caused by *Salmonella* affected a total of 30,638 persons with 10.8% hospitalised and 12 deaths reported.

Salmonella not further specified ('*Salmonella* spp.') was responsible for 78% (3,971 out of 5,067) of these outbreaks. These data likely include a number of different *Salmonella* serovars. In outbreaks where the serovar is known, *S.* Enteritidis was responsible for 90% of outbreaks. (Table OUT3).

Table OUT3. *Salmonella* serovars responsible for foodborne outbreaks showing number of outbreaks and numbers of persons affected, hospitalised and died, 2004

***Salmonella* serotype**	**Number of outbreaks**	**Percent of all outbreaks**	**Number of people affected**	**Number of people hospitalised**	**Number of people died**
Salmonella spp.	3,971	57.89	17,643	1,243	0
S. Agona	1	0.01	19	0	0
S. Brandenburg	2	0.03	3	0	0
S. Bredeney	1	0.01	4	0	0
S. Coeln	1	0.01	2	1	0
S. Derby	1	0.01	43	0	0
S. Dugbe	1	0.01	2	0	0
S. Enteritidis	982	14.30	11,142	1,913	12
S. Give	1	0.01	47	1	0
S. group B	2	0.03	6	1	0
S. group C	1	0.01	30	2	0
S. group C2	2	0.03	4	1	0
S. group D	7	0.10	17	0	0
S. group E	1	0.01	2	0	0
S. Hadar	2	0.03	42	0	0
S. Heidelberg	1	0.01	9	8	0
S. IIIb 48: lv,z13:1,5,7	1	0.01	2	0	0
S. Infantis	12	0.17	111	12	0
S. Leith	1	0.01	2	0	0
S. Mikawasima	1	0.01	12		
S. Newport	4	0.06	299	40	0
S. Poona	1	0.01	2	1	0
S. Thompson	3	0.04	39	0	0
S. Typhimurium	64	0.93	1,101	75	0
S. Uganda	1	0.01	8	0	0
S. Virchow	3	0.04	47	6	0
Total	**5,067**	**73.86**	**30,638**	**3,304**	**12**

Important outbreaks

Greece reported the largest *Salmonella* outbreak caused by *S.* Enteritidis. This outbreak resulted in 651 ill persons, with 247 hospitalisations and one death. An epidemiological investigation identified dry fruit and nuts as the source. The outbreak occurred following a church gathering.

Austria reported a *S.* Typhimurium DTU291 outbreak from a restaurant that affected 233 people. A case series investigation implicated tiramisu – a dessert containing raw eggs – and walnut cake, as the food vehicles.

S. Typhimurium DT104 is an important phage type due to its frequent multiresistance to antimicrobials. The United Kingdom reported an outbreak from a fast food outlet affecting 174 people with ten hospitalisations. *S.* Typhimurium DT104 was isolated from mayonnaise. The United Kingdom also reported an infected foodhandler as the source of a second *S.* Typhimurium DT104 outbreak with 126 cases.

The United Kingdom reported three S. Newport outbreaks with lettuce as the food vehicle confirmed by statistical evidence. These outbreaks resulted in 297 ill persons and 40 people requiring hospitalisation.

A multi-state outbreak of S. Give was investigated in Germany. There were 115 cases reported with a proportion hospitalised higher than expected. Consumption of raw minced pig meat was identified as a risk factor for illness in a case control study.

Norway reported a hospital-based outbreak caused by foodhandler contamination with *S.* Infantis resulting in illness in 68 persons.

Of the new MS, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia reported *Salmonella* outbreaks. The Czech Republic reported more outbreaks (34.2% of all outbreaks) than any other new MS; most were family outbreaks. In Lithuania the largest outbreak was caused by *S.* Enteritidis due to consumption of Farsi salmon filled with raw eggs. Fifty-two persons were ill and 28 hospitalised.

Phage type

Austria, Finland, Norway, Portugal, Slovakia and the United Kingdom provided phage type information on *S.* Enteritidis. From the total number of *S.* Enteritidis outbreaks (n=811) (Table OUT3) these countries reported the phage type in 320 of them. Seventeen different phage types were reported. The five most commonly reported were *S.* Enteritidis PT4 (n=120), PT8 (n=105), PT21 (n=24), PT14b (n=15) and PT1 (n=13).

Austria, Denmark, Finland, Sweden and the United Kingdom provided phage type information on *S.* Typhimurium. From the total number of *S.* Typhimurium outbreaks (n=58) (Table OUT3), these countries reported the phage type in 37 outbreaks. Ten different phage types were reported. The most commonly reported were *S.* Typhimurium DT46 (n=15), DT120 (n=6) and DT104 (n=5).

Location of exposure

Specific information on the location of exposure was available for 8.9% (453 out of 5,067) of domestic *Salmonella* outbreaks reported (Table OUT4). Private homes and restaurants were most commonly reported as the location of exposure to *Salmonella*.

Table OUT4. Categories of exposure locations of people in *Salmonella* outbreaks in EU, 2004[1]

Setting exposed	Number of outbreaks	Number of people affected
Abroad	38	181
Bakery	3	42
Camp	10	118
Catering	3	181
Community	1	21
Contaminated product	2	10
Fast food outlet	3	186
Hospital	9	152
Institution	49	1,090
Not reported	29	871
Other	5	856
Private home	140	1,226
Restaurant	92	1,362
Takeaway	10	216
Unknown	59	136
Total	**453**	**6,648**

1. Only domestic outbreaks with specific information on source were included.

Sources of infection

Data on sources of infection was provided in 7.9% (400 out of 5,067) of *Salmonella* outbreaks. (Table OUT5). There were 105 outbreaks reported where source was confirmed. Level of evidence was stated in 73 outbreaks: microbiological confirmation in 42 outbreaks, epidemiological evidence in seven, descriptive epidemiology in six, and both microbiological and epidemological evidence in seven outbreaks. There were 191 outbreaks where the source was suspected, and for the remaining 104 outbreaks source was unknown.

Table OUT5. Sources implicated in *Salmonella* outbreaks, 2004

Source	Number of general outbreaks	Number of family outbreaks	Number of people affected	Number of people hospitalised
Bakery products	17	15	392	22
Bovine meat	2	1	23	2
Carrier person	2	2	26	2
Broiler meat	14	19	227	22
Dairy product	6	10	95	14
Duck meat	1	1	8	2
Eggs and egg products	44	38	1,307	56
Foodhandler contamination	3	-	90	3
Fruit or vegetables	9	3	1,000	9
Meat unspecified	10	9	218	11
Pig meat	11	7	204	9
Poultry meat other	-	1	7	1
Seafood	6	7	173	10
Other food	1	-	10	-
Unknown	74	70	1,853	118
Water	3	1	690	4
Only meal identified	12	1	304	10
Total	**215**	**185**	**6,627**	**295**

Eggs and egg products was the group most frequently associated with outbreaks, in 82 outbreaks. Bakery products, broiler meat, pig meat, and meat unspecified were also common causes of outbreaks.

5.3. Foodborne outbreaks caused by Campylobacter spp.

Campylobacter caused 18% (1,243) (Table OUT2) of reported outbreaks with a low percent hospitalised (0.04%). Thirteen MS and Norway reported outbreaks of campylobacteriosis.

C. jejuni was identified in 82% of outbreaks where typing of the agent was reported (in 2.7% outbreaks). *C. coli* was identified in two family outbreaks in Austria. The largest single outbreak of identified *C. jejuni* was reported in Norway, affecting 15 people.

Of the new MS, Czech Republic reported 547 outbreaks (out of which 542 were family outbreaks) caused by *Campylobacter* affecting 1,555 people, with 90 hospitalisations. Hungary reported one large waterborne outbreak of campylobacteriosis affecting 203 people.

Location of exposure

Information on the location of exposure was available for 72 *Campylobacter* outbreaks. The most commonly reported locations were the home (74%) and restaurants (14%).

Source of infection

Source was reported in 30 outbreaks (Table OUT6).

Table OUT6. Sources implicated in *Campylobacter* outbreaks, 2004

Source	Number of outbreaks	Number of people affected
Bovine meat	1	2
Broiler meat	8	63
Eggs and egg products	1	2
Fruit or vegetables	1	8
Meat unspecified	2	4
Only meal identified	1	11
Poultry meat other	1	2
Water	6	242
Unknown	9	38
Total	**30**	**372**

5.4. Foodborne outbreaks caused by pathogenic E. coli

There were 87 outbreaks caused by pathogenic *E. coli* during 2004. These outbreaks affected 627 persons, and 52 required hospitalisation. There were no deaths reported.

Austria reported 3 VTEC outbreaks, with 9 people affected. Germany reported 36 VTEC outbreaks, affecting 92 people. The United Kingdom reported two *E. coli* O157 outbreaks. The largest outbreak affected 134 people. Cooked meat sandwiches from a single shop were identified as the source. Denmark reported its first outbreak of VTEC in 2004. See text box below.

E. coli, other than VTEC, outbreaks were reported in three countries: Czech Republic, Poland and Portugal. Czech Republic reported 26 outbreaks with 108 persons ill, and 18 hospitalisations. Poland reported 13 outbreaks with 213 cases, and 23 hospitalisations.

Denmark experienced its first two VTEC outbreaks, of which one was foodborne. In this outbreak, there were 25 confirmed cases caused by *E. coli* O157:H- of phage type 8 that encoded virulence genes vtx1, vtx2x and eae. The source was traced back to an organic dairy with a small-scale contamination. Milk from this dairy was sold in one supermarket chain.

5.5. Foodborne outbreaks caused by Yersinia spp.

In 2004, there were 51 outbreaks (0.8%) (Table OUT2) caused by *Yersinia*, affecting 182 people and hospitalising five. Six member states reported outbreaks: Austria, Czech Republic, Denmark, Finland, Germany and Portugal.

Portugal and Finland (see text box) reported outbreaks with a known source. An outbreak in Portugal caused by ingestion of raw hamburger meat caused illness in three family members.

Finland reported the largest *Yersinia* outbreak caused by *Y. pseudotuberculosis* O:1, affecting 58 people and hospitalising three people. The source was confirmed to be grated carrots that were widely distributed. Carrots were traced back to the farm. The exact mechanism of contamination is unknown but it is likely that soil was contaminated with animal faeces.

Of the new MS, Czech Republic reported eight outbreaks affecting 22 people.

5.6. Foodborne outbreaks caused by other bacterial agents

Brucella

Spain is the only MS to report *Brucella* outbreaks. In 2004, they reported three foodborne outbreaks of brucellosis causing illness in 35 people, and one hospitalisation. Cheese was the identified source in all three outbreaks.

Leptospira

Latvia reported two cases of leptospirosis. No further information was available.

Shigella

Shigella outbreaks were reported by three MS: Latvia, Lithuania and Poland. Latvia reported 14 outbreaks (13 *Shigella* sonnei and one *Shigella flexneri*) affecting 164 people. Contaminated milk and dairy products were the identified as the food vehicle in six outbreaks. Meat was identified as the cause in two outbreaks; in six outbreaks the food source was unknown. Lithuania reported three *Shigella sonnei* outbreaks causing illness in 93 people. In the largest outbreak, fifty-six percent (23 out of 41) of cases were hospitalised following consumption of unpasteurised curd made on a private farm and sold in two markets. Poland reported three shigellosis (*S. flexneri*) outbreaks, with 31 cases and 20 hospitalisations.

Bacterial toxins

Outbreaks caused by bacterial toxins were reported in 11 MS and Norway (Table OUT7). There were 59 outbreaks (1.2%) (Table OUT2) involving toxins, which included 35 outbreaks due to Staphylococcal enterotoxins and 18 outbreaks due to *Clostridium spp.* Morbidity and mortality were higher for *Staphylococcus aureus* and *Clostridium perfringens* than for most other causes of outbreaks. Outbreaks caused by *S. aureus* resulted in 777 cases, 14 hospitalisations and one death. *Clostridium spp.* caused 650 cases, 17 hospitalisations and two deaths.

Table OUT7. Outbreaks caused by bacterial toxins showing number of outbreaks and number of persons affected, 2004

Zoonotic Agent	Number of general outbreaks	Number of family outbreaks	Number affected	Number hospitalised	Number of deaths
Bacillus cereus	5	1	96	0	0
Clostridium botulinum	1	6	21	15	1
Clostridium perfringens	10	1	629	2	1
Staphylococcus aureus	28	7	777	14	1
Total	**44**	**15**	**1,523**	**31**	**3**

The largest single outbreak of *Clostridium perfringens* was reported by the United Kingdom and affected 400 people. A variety of foods consumed in a club were implicated. Both microbiological and statistical evidence confirmed the source.

Belgium reported a large outbreak *of Bacillus* cereus affecting 50 people. Pasta was the identified meal.

Finland reported five toxin outbreaks. The largest was an outbreak of *C. perfringens* from pork causing illness in 58 people.

Norway reported one *B. cereus* outbreak and two *S. aureus* outbreaks.

Portugal reported eight outbreaks: five *C. perfringens*, three *S. aureus*. The largest outbreak affected 20 people and was caused by contaminated pastry cakes.

Of the new MS, Poland reported 18 outbreaks, 17 were *S. aureus*. These outbreaks resulted in 664 cases, four hospitalisations and one death. A *C. botulinum* outbreak resulted in all nine cases requiring hospitalisation. Latvia reported three *S. aureus* family outbreaks. Lithuania report a *C. botulinum* outbreak with three cases from mushrooms canned at home. Slovenia reported one *S. aureus* outbreak with seven cases. The identified food was cottage cheese.

Sources of intoxication

Meat was identified as the source in 25% (15 out of 59) of bacterial toxin outbreaks. Bakery products were identified in four outbreaks, dairy products in three and sauces in two. Forty-four percent outbreaks were confirmed with laboratory evidence. Epidemiological evidence confirmed the source in two further outbreaks. In 51% (30 out of 59) of the outbreaks, no source information was provided.

5.7. Foodborne outbreaks caused by viruses

Foodborne viruses (hepatitis A, rotavirus, and calicivirus, including norovirus) caused 86 (1.7%) (Table OUT 2) outbreaks in eight countries, affecting more than 3,010 people (Table OUT 8).

Table OUT8. Countries reporting outbreaks caused by foodborne viruses, 2004

Country	Foodborne virus not specified	adenovirus	astrovirus	calicivirus (including norovirus)	hepatitis A virus	rotavirus	Total
Austria	-	-	-	-	1	-	1
Belgium	-	-	-	2	2	-	4
Finland	-	-	-	10	-	-	10
The Netherlands	-	-	-	7	-	-	7
Poland	-	1	-	3	-	7	11
Slovenia	-	-	2	12	-	10	24
Sweden	-	-	-	18	-	1	19
United Kingdom	3	-	-	6	-	1	10
Total	**3**	**1**	**2**	**58**	**3**	**19**	**86**

Calicivirus including norovirus

Sixty-seven percent (58) of these outbreaks were caused by caliciviruses, including norovirus. Caliciviruses are the most common cause of non-bacterial foodborne outbreaks. Illness is usually mild and short-lived, and attack rates are high. Caliciviruses were responsible for the majority of cases caused by viruses (2,540) and 43 hospitalisations. There were no deaths reported. The largest reported outbreak was reported by Sweden with 200 cases. Homemade cakes were identified as the source.

Poland, Slovenia and Hungary were the only new MS to report viral outbreaks. Poland reported 11 outbreaks of adenovirus, calicivirus and rotavirus. Outbreaks occurred mainly in institutions and at work places. Slovenia reported 12 outbreaks of calicivirus affecting 466 people. A waterborne outbreak was responsible for illness in 80 people. The remaining 11 outbreaks were caused through person-to-person transmission. Hungary reported a large waterborne outbreak affecting 203 people caused by sewage contaminated drinking water.

Location of exposure

Locations were reported in 93% (54) of calicivirus outbreaks. Catering services and restaurants were the location in 35% (19) of outbreaks, and hotels in four outbreaks. Institutions, including schools and aged care facilities, were the location in 33% (18) outbreaks.

Sources

Sources of infection were reported in 47% (27 out of 58) of calicivirus outbreaks. Sources were oysters in four outbreaks, water in four, fruit and vegetables in four, bakery products in three, and foodhandler contamination in 11 cases. Exposure to contaminated fruits and vegetables caused the largest number of cases. (Table OUT9).

Table OUT9. Number of people affected with calicivirus by source, 2004

Exposure	Number of people affected
Bakery products	227
Fruit or vegetables	387
Seafood	60
Only meal identified	283
Other processed foods, prepared dishes	14
Water	339
Person-to-person	386
Unknown	86
Total	**1,782**

Given the low infectious dose of caliciviruses, especially norovirus, person-to-person transmission is common. Often it is difficult to identify whether the food is contaminated at the source, as is common with oysters, or the food is contaminated by a sick foodhandler, or further person-to-person transmission occurred. Data reported for calicivirus outbreaks includes all sources of contamination.

Other viral outbreaks

Poland reported an adenovirus outbreak in a boarding school affecting 14 people. Slovenia reported two astrovirus outbreaks, one in a hospital and one in a residence for students.

There were three outbreaks of hepatitis A. One in Austria affecting 13 people, and two in Belgium affecting 19 people with two hospitalisations. No further information was provided.

Rotavirus was responsible for 19 outbreaks, affecting 321 people, of which 83 people were hospitalised. Rotavirus is commonly spread person-to-person particularly in children. Forty-two percent of outbreaks were reported in children's institutions. Slovenia reported ten outbreaks and Poland reported seven.

5.8. Foodborne outbreaks caused by parasites

Trichinella

There were 15 outbreaks of trichinellosis affecting 196 people, of which 145 people were hospitalised. Lithuania reported four outbreaks with 20 cases caused by eating undercooked wild boar meat and pig meat. Poland reported four outbreaks with 157 cases and 131 hospitalisations. Czech Republic and Latvia also reported outbreaks. Pig meat and wild boar meat sausages were foods identified.

Diphyllobothrium

Latvia was the only MS to report an outbreak of diphyllobothriasis. Two people became ill after consuming infected fish.

5.9. Foodborne outbreaks caused by marine biotoxins and other toxins

Four countries reported histamine poisoning, scombrotoxin or marine biotoxin outbreaks: Belgium, Finland, Portugal and Sweden.

There were seven histamine poisoning (including scombrotoxin) outbreaks reported. Belgium reported two outbreaks of histamine poisoning from tuna. Five people were ill. Finland reported two outbreaks with 6 and 24 people ill, also from tuna. Sweden reported two outbreaks from cooked fish, affecting four people. Portugal reported an outbreak with eight people ill from tuna; scombrotoxin was confirmed in the fish.

Sweden reported an outbreak with 12 people caused by cooked shellfish containing marine biotoxins, not further specified.

5.10. Foodborne outbreaks caused by other agents

Lectin

Finland reported a lectin outbreak caused by the consumption of undercooked beans. Twelve people were affected and one hospitalised.

5.11. Waterborne outbreaks

Waterborne outbreaks are frequently large outbreaks especially if a source of drinking water is contaminated.

Greece reported two waterborne outbreaks caused by *Salmonella* affecting 526 and 125 people. No further information was available.

Hungary reported a waterborne outbreak caused by norovirus and *Campylobacter* affecting 203 people. A waterborne outbreak in Slovenia was responsible for illness in 80 people. Both outbreaks were caused by contaminated drinking water.

Norway reported an outbreak of giardiasis affecting 1300 people caused by contaminated drinking water. Norway also reported an outbreak of waterborne campylobacteriosis affecting 15 people.

5.12. Summary on foodborne outbreaks

This is the first year where data on foodborne disease outbreaks has been summarised at the Community level. Data was received from 20 MS and Norway. All new MS reported outbreaks in 2004.

The most common cause of outbreaks in the EU in 2004 was *Salmonella*, causing the largest number of outbreaks and by far the largest number of human infections. *Salmonella* outbreaks were reported in all 20 MS that provided data on outbreaks, and in Norway. *S.* Enteritidis was the predominant serovar associated with these outbreaks. Eggs and meat products were the most important sources.

The second most common cause of outbreaks in 2004 was *Campylobacter*. Outbreaks of campylobacteriosis were reported by 13 MS and Norway, and *C. jejuni* was the species most commonly reported in outbreaks were speciation was carried out. The majority of *Campylobacter* outbreaks, with a known aetiology, were associated with broiler meat and water.

Other major causes of foodborne outbreaks in the EU were pathogenic *E. coli*, *Yersinia* spp. and foodborne viruses.

Only a few foodborne outbreaks caused by parasites were reported. Outbreaks caused by *Trichinella* were reported by the new MS Lithuania and Poland. The sources of these outbreaks were pig or wild boar meat. The largest outbreak reported in 2004 was reported by Norway, involving 1,300 people infected with *Giardia* by drinking contaminated water.

MS were requested to provide any outbreak data available. Data received was generally complete and of a high quality. However, these data differed between MS and some data quality issues were identified. Some MS, particularly the most populous, provided aggregated data for outbreaks. This meant that details on locations and sources of outbreaks were not available for the majority of outbreaks.

Most MS identified the need for a centralised and coordinated system for outbreak data collection within their countries. As these systems improve, an increase in the number of identified and reported outbreaks may be expected.

5.13. Sources of outbreak data

A foodborne outbreak is defined by the Zoonoses Directive 2003/99/EC as 'an incidence, observed under given circumstances, of two or more human cases of the same disease and/or infection, or a situation in which the observed number of cases exceeds the expected number and where the cases are linked, or are probably linked, to the same food source'.

Data was received from 20 MS and Norway. All new MS reported outbreaks in 2004. No data were available from France, Italy, Luxembourg and Malta. Data quality varied between countries. Some countries entered a line listing of outbreaks others reported aggregated data. As such detailed analysis is limited.

Fourteen MS and Norway provided information on their outbreak reporting systems. All reported systems of national data collection through centralised reporting and most MS had mandatory reporting systems. The completeness of these outbreak-reporting systems depends on two components: the ability to detect outbreaks at the local level followed by reporting to the national authority. Most MS indicated that outbreaks are under-reported due to these two factors.

Levels of evidence

Ultimately a foodborne disease outbreak investigation will identify the source of the aetiological agent i.e. the contaminated raw product. This will usually require a combination of microbiological and epidemiological evidence. Without this evidence the source of infection is 'suspected'. In 2004, the information on 'source', 'suspected' and 'confirmed' evidence is reported in an inconsistent way as no harmonised definitions have been agreed on so far.

APPENDIX 1

Appendix Table BR1. Notification of *Brucella* in humans, animals and food, 2004

	Notifiable in humans since	Notifiable in animals since	Notifiable in food since
Austria	1947[1]	1957	1975
Belgium	<1999	1978	2004
Cyprus	1983	-	-
Czech Republic	yes	yes	-
Denmark	no[4]	1920[3]	-
Estonia	1947	1962	no
Finland	1995	1920's	1920's
France	yes[7]	-	-
Germany	yes	yes	-
Greece	yes	1972	-
Hungary	1950	1928	no
Ireland	1948	-	-
Italy	1990	1954	1929
Latvia	1974	yes	-
Lithuania	1957	>30 years	-
Luxembourg	-	-	-
Malta	-	-	-
Norway	1975[6]	1903	no
Poland	yes	1951	-
Portugal	yes	yes	-
Slovakia	yes	no	no
Slovenia	yes	<1991[2]	2003
Spain	1943	1952	1952
Sweden	2004	yes	no
The Netherlands	yes	yes	yes
United Kingdom	1996[5,6]	1971	1989

1. In Austria, notifiable since 14 April 1913, re-proclaimed 12 June 1947, adapted on 28 April 1950.
2. In Slovenia, the year of independence. The disease was notifiable before 1991.
3. In Denmark, only clinical cases are notifiable.
4. In Denmark, only imported cases registered.
5. In United Kingdom, reportable under Reporting of Injuries, Disease and Dangerous Occurrences. Regulations – applies to all work related activities but not to all incidents.
6. In Norway and the United Kingdom, imported or laboratory infected cases occur.
7. In France, mainly imported cases.

Appendix Table EH1. *Echinococcus* monitoring programmes and diagnostic methods in humans and/or animals, 2004

Country	Type of data	Diagnostic methods	Monitoring, treatment, etc.
Austria	Laboratory confirmed	Histopathology, ultrasound, X-ray, computed tomography, serology or combo serology DNA (PCR)	-
Belgium	-	-	Information campaign in wooded areas about consumption of berries
Cyprus	-	-	Scheme to treat dogs with Pranziquantel, surveillance of humans cases to evaluate the prev. programs in animals
Czech Republic	-	-	-
Denmark	Laboratory confirmed	Abdominal CT Scan, serology, histopathology	-
Estonia	Laboratory confirmed	-	-
Finland	Laboratory confirmed	-	Treatment required for imported dogs and cats, recommended for hunting dogs before and after hunting season
France	Voluntary surveillance	-	Survey evaluating transmission from pet animals to man
Germany	-	-	-
Greece	-	Xray/echo+sero investigation	-
Hungary	Laboratory confirmed	Western blot	-
Ireland	-	-	-
Italy	-	-	-
Latvia	Laboratory confirmed/ monthly	Serology	-
Lithuania	Laboratory confirmed	Histopathology, imaging, serology	-
Luxembourg	-	-	-
Norway	Laboratory confirmed	Serology and histopathology	-
Poland	Laboratory confirmed	Serology and histopathology	-
Portugal	-		-
Slovakia	Laboratory confirmed	Serology and histopathology	-
Slovenia	-	-	-
Spain	-	-	Control of annual infection in animals from endemic regions
Sweden	Laboratory confirmed, passive case finding	Serology and histopathology	-
The Netherlands	Laboratory confirmed	Serology	-
United Kingdom	Voluntary reporting	-	-

Appendix Table EH2. Notification of *Echinococcus* in humans, animals and food, 2004

	Notifiable in humans since	Notifiable in animals since	Notifiable in food since
Austria	2004	1994	1994
Belgium	<1999	1998	2004
Cyprus	-	-	-
Czech Republic	yes	no	-
Denmark	no (2005)	yes	-
Estonia	1986	2000	2000
Finland	1995	1995[1]	19951
France	no	-	-
Germany	yes	-	-
Greece	yes	1980	
Hungary	1960	no	1984
Ireland	2004	-	-
Italy	1990	no	1964
Latvia	1999	yes	-
Lithuania	1990	yes	-
Luxemburg	-	-	-
Malta	-	-	-
Norway	2003	1985	1965
Poland	-	-	-
Portugal	yes	yes	-
Slovakia	yes	yes[2]	no
Slovenia	1949	1991[3]	2003
Spain	1982	1994	1994
Sweden	2004	yes	yes
The Netherlands	no	yes	yes
United Kingdom	no	no	no

1. In Finland, notifiable also before 1995, but legislation changed in 1995.
2. In Slovakia, only clinical cases.
3. In Slovenia, the year of independence, however this disease was notifiable before 1991.

Appendix Table LI1. Monitoring programmes and diagnostic methods for *Listeria monocytogenes*, 2004

Country	Surveillance	Frequency and type of samples	HACCP
Austria	No monitoring programme. Surveys by the local authorities	-	yes
Belgium	Monitoring programme started in 2004	Fresh meat and final products sampled weekly	-
Cyprus	-	-	-
Czech Republic	Monitoring according to the Decree of the Ministry of Health No. 132/2004 Coll	-	yes
Denmark	No monitoring programme. Surveys by the local authorities	-	-
Estonia	No monitoring programme. Surveys by the local authorities	Random sampling	-
Finland	Survey on smoked and marinated fish	Random sampling	-
France	-	-	-
Germany	Monitoring, surveys and own-control	-	-
Greece	No monitoring programme. Surveys by the local authorities	Routine and target sampling	-
Hungary	Monitoring milk products (EU requi-rements) based on Directive 92/46	-	-
Ireland	-	-	-
Italy	-	-	yes
Latvia	No monitoring programme. Surveys by the local authorities	Random sampling	yes
Lithuania	-	-	-
Luxembourg	-	-	-
Malta	Survey on cheese	-	-
Norway	Monitoring milk products (EU requirements)	Soft cheeses and fresh milk cheeses. 1 sample out of every 20 batchs	-
	Survey of imported products	Soft cheeses	
Poland	-	-	-
Portugal	Surveillance in raw milk and milk cheese	-	-
Slovakia	No monitoring programme. Surveys by the local authorities	-	-
Slovenia	No monitoring programme. Surveys by the local authorities	-	yes
Spain	-	-	-
Sweden	No official programme. Surveys by the local authorities	Depend on survey	random sampling
The Netherlands	-	-	-
United Kingdom	No monitoring programme. National and regional surveys by the local authorities	Depend on survey	surveys

Appendix Table LI1. Monitoring programmes and diagnostic methods for *Listeria monocytogenes*, 2004 (cntd.)

Country	Diagnostic method	Survey on cheeses from raw and thermised milk[1]	Human diagnostic
Austria	ISO 11290-1:1996 (E):1996,1998	-	Isolation of L. monocytogenes from blood, cerebral spinal fluid, vaginal swabs
Belgium	Afnor validated VIDAS LMO2 followed by a chromogenic medium	-	-
Cyprus	-	-	-
Czech Republic	ISO 11290-1:1996 (E):1996,1998	yes	-
Denmark	-	yes	Bacteriology
Estonia	NMKL 136, 2004 ISO 11290-1:1996 (E):1996,1998	-	Isolation of L. monocytogenes from blood and cerebral spinal fluid
Finland	ISO 11290-1:1996 (E):1996,1998	yes	Bacteriological culture
France	-	-	-
Germany	-	-	Isolation of L. monocytogenes from blood and cerebral spinal fluid
Greece	-	-	-
Hungary	-	-	Isolation of L. monocytogenes from blood and cerebral spinal fluid
Ireland	-	-	-
Italy	-	-	-
Latvia	ISO 11290-1:1996 (E):1996,1998	-	Microbiological identification
Lithuania	-	-	Isolation of L. monocytogenes from blood and cerebral spinal fluid
Luxembourg	-	-	-
Malta	-	-	-
Norway	NMKL 136	-	Isolation of L. monocytogenes from blood and cerebral spinal fluid
Poland	-	-	Isolation of L. monocytogenes from blood and cerebral spinal fluid, articular or pericardial fluid
Portugal	ISO 11290	-	-
Slovakia	ISO 11290	-	Isolation of L. monocytogenes from blood and cerebral spinal fluid
Slovenia	ISO 11290-1:1996 (E):1996,1998	-	-
Spain	-	-	-
Sweden	NMKL 136:2004, SLO METHOD	-	Isolation of L. monocytogenes from blood and cerebral spinal fluid
The Netherlands	-	-	-
United Kingdom	-	yes	Culture

1. Commission Recommendation 2004/24/EC, made under Article 14(3) of the Official Control of Foodstuffs Directive 89/397/EEC required MS to assess the microbiological quality of cheeses made from raw and thermised milk at production and rerail level.

Appendix Table LI2. Notification of *Listeria* in humans, animals and food, 2004

	Notifiable in humans since	Notifiable in animals since	Notifiable in food since
Austria	1947[1]	no	1975
Belgium	<1999[2]	1998	2004
Cyprus	no	-	-
Czech Republic	yes	no	-
Denmark	1993	no	-
Estonia	2003	2000	2000
Finland	1995	1995[3]	no[4]
France	yes	-	-
Germany	yes	yes	-
Greece	yes	1980	-
Hungary	1998	no	2003
Ireland	2004	-	-
Italy	1990	no	1962
Latvia	1990	yes	2003
Lithuania	1998	>30 years	-
Luxembourg	-	-	-
Malta	yes	-	-
Norway	1975	1965	no
Poland	yes	-	-
Portugal	yes	no	-
Slovakia	yes	yes	2000
Slovenia	1977	1991[5]	2003
Spain	1982[6]	1994	1994
Sweden	>30 years[7]	yes	no
The Netherlands	no	yes	yes
United Kingdom	no	no	no

1. In Austria, notifiable since 14 April 1913, re-proclaimed 12 June 1947, adapted on 28 April 1950.
2. In Belgium, in the Flemish Community.
3. In Finland, notifiable also before 1995, but legislation changed in 1995.
4. In Finland, food business operator has to notify to the competent authority, but there is no central notification system.
5. In Slovenia, the year of independence, however this disease was notifiable before 1991.
6. In Spain, only hospitalised cases are notifiable.
7. In Sweden, only clinical cases notifiable.

Appendix Table PO1. Human population per 100,000, 1999-2004

	2004	2003	2002	2001	2000	1999
Austria	81,401	81,022	80,651	80,209	80,022	79,825
Belgium	103,964	103,558	103,097	102,634	102,391	102,138
Cyprus	7,304	7,151	7,055	6,975	6,905	6,829
Czech Republic	102,115	102,033	102,064	102,320	102,781	102,896
Denmark	53,976	53,835	53,684	53,492	53,300	53,136
Estonia	13,510	13,560	13,612	13,670	13,721	13,792
Finland	52,197	52,063	51,949	51,811	51,713	51,596
France	599,007	596,350	593,425	590,427	587,487	584,966
Germany	825,317	825,367	824,403	822,595	821,635	820,370
Greece	110,411	110,064	109,687	109,312	109,038	108,614
Hungary	101,167	101,424	101,749	102,003	102,216	102,534
Ireland	40,277	39,637	38,999	38,330	37,778	37,322
Italy	578,882	573,211	569,937	569,677	569,295	569,136
Latvia	23,192	23,315	23,458	23,643	23,817	23,992
Lithuania	34,459	34,626	34,756	34,870	35,121	35,364
Luxembourg	4,516	4,483	4,441	4,390	4,336	4,274
Malta	3,999	3,973	3,946	3,914	3,802	3,785
Poland	381,906	382,185	382,422	382,540	386,536	386,670
Portugal	104,747	104,075	103,293	102,567	101,950	101,489
Slovakia	53,801	53,792	53,790	53,788	53,987	53,934
Slovenia	19,964	19,950	19,940	19,901	19,878	19,783
Spain	423,453	415,506	408,505	403,764	399,607	397,244
Sweden	89,757	89,408	89,091	88,828	88,614	88,543
The Netherlands	162,580	161,926	161,053	159,871	158,640	157,602
United Kingdom	596,731	593,289	591,399	598,628	596,234	593,911
EU-Total	**4,568,633**	**4,545,803**	**4,526,406**	**4,520,159**	**4,510,804**	**4,499,745**
Norway	45,775	45,523	45,241	45,034	44,785	44,453

Appendix Table PO2. Animal populations, 2004

	Cattle	Ducks	Broilers	Laying hens	Total *Gallus gallus*
Austria	2,050,991	-	55,475,388	-	56,025,203
Belgium	2,781,676	33,949	27,873,988	14,364,922	50,947,719
Cyprus	62,201	66,540	16,569,000	415,000	-
Czech,Republic	1,428,329	3,224,065	176,009,350	7,513,650	185,724,385
Denmark	1,734,501	-	21,927,907	4,032,492	25,960,399
Estonia	253,149	-	-	-	2,197,359
Finland	951,900	1,826	5,573,229	3,069,195	10,405,204
France	19,200,000[3]	-	-	-	-
Germany	13,031,000	2,626,000[3]	54,611,000[3]	38,965,000[3]	109,793,000[3]
Greece	870,691	15,316	112,000,000	6,227,830	-
Hungary	721,000	2,702,000	23,554,000	12,233,002	39,067,000
Ireland	-	-	-	-	-
Italy	6,309,034	-	96,708,718[6]	44,781,166[6]	171,343,324[6]
Latvia	376,547	117	1,060,267	1,584,927	2,778,936
Lithuania	916,715	46,739	24,000,000	2,300,000	26,728,000
Luxembourg	183,367	-	-	-	79,162
Malta	19,662	-	1,340,000	539,000	1,887,000
Norway	936,600	64,700[2]	42,851,700[2]	2,469,200[2]	-
Poland	5,649,362	1,696,700	118,264,000	39,469,000	165,154,000
Portugal	1,389,911	4,000,000	205,000,000	154,000	-
Slovakia	559,054	9,000	20,800,000	2,500,000	25,580,000
Slovenia[3]	478,331	20,304	2,604,304	1,387,408	-
Spain	6,537,780	-	606,563,500[2,7]	494,144,000	632,370,700[2,7],
Sweden	1,606,674[3]	44,272[2]	5,905,679[3]	4,497,678[3]	-
The Netherlands[2]	1,960,000	6,126,000	397,046,000	12,149,000	409,295,000
United Kingdom	10,603,000	2,392,523	119,912,000	29,662,000	919,940,000[2]

1. Meat production animals.
2. Number slaughtered only.
3. 2003 data.
4. Sheep and Goats.
5. 2002 data.
6. 2000 data.
7. 2001 data. Appendix Table PO2. Animal populations, 2004.

Appendix Table PO2. Animal populations, 2004 (cntd.)

	Geese	Goats	Pigs	Sheep	Solipeds	Turkeys
Austria	-	55,523	3,125,361	327,163	-	1,875,950
Belgium	4,834	37,666	5,662,440	214,612	-	498,146
Cyprus	-	309,675	468,314	242,926	-	1,144,00[1]
Czech Republic	257,079	18,912	3,126,539	115,852	20,371	837,418
Denmark	-	19,598	13,251,064	200,762	-	490,930
Estonia	-	1,616	369,192	39,192	4,155	-
Finland	1,841	759	1,435,000	72,000	24,200	535,289
France	-	1,176,000	15,046,000	5,461,065[2]	24,433[2]	-
Germany	384,000[3]	-	26,335,000	2,713,000	525,000[3]	10,604,000[3]
Greece	9,313	3,070,033	2,096,754	5,328,102	53,556	212,500
Hungary	2,427,000	74,000	4,287,000	1,397,000	67,000	5,454,000
Ireland	-	-	-	-	-	-
Italy	356,887[6]	8,589,814[4,3]	8,614,016	-	184,731[6]	12,937,490[6]
Latvia	795	14,500	340,296	35,699	17,700	91
Lithuania	52,437	7,112	1,057,358	34,292	63,587	98,438
Luxembourg	-	1,970	83,432	9,792	3,405	-
Malta	-	6,583	53,300	13,103	2,136	
Norway	260[2]	71,000	1,469,200[2]	2,412,700	2,000[2]	1,035,200[2]
Poland	3,796,400	53,940	13,104,000	216,707	320,000	10,824,900
Portugal	-	2,856,520[4]	-	-	-	4,582,000
Slovakia	6,000	2,299	2,230,707	261,269	5[2]	150,000
Slovenia[3]	3,862	28,690	607,881	119,631	16,879	310,285
Spain	-	3,046,716[5]	23,517,741[5]	23,813,173[5]	238,096[5]	91,199,600[2,7]
Sweden	29,067[2]	5,509[3]	1,903,126[3]	448,308[3]	271,000[3]	285,696[3]
The Netherlands[2]	-	20,000	14,340,000	620,000	2,000	2,210,000
United Kingdom	157,690[3]	92,000	5,161,000	35,890,000	299,886	7,521,967[3]

1. Meat production animals.
2. Number slaughtered only.
3. 2003 data.
4. Sheep and Goats.
5. 2002 data.
6. 2000 data.
7. 2001 data.

Appendix Table PO3a. Animal herd populations, 2004

2004	Cattle		Ducks		Farmed Deer		Farmed Reindeer	
	Herds	Holdings	Flocks	Holdings	Herds	Holdings	Herds	Holdings
Austria	-	86,034	-	-	-	-	-	-
Belgium	-	44,555	-	31	-	2,965	-	-
Cyprus	370	370	-	-	-	-	-	-
Czech Republic	-	27,806	-	35	-	265	-	-
Denmark	32,412	-	-	-	-	-	-	-
Estonia	9,382	9,382	-	-	-	-	-	-
Finland	-	22,882	-	135	-	7	-	5,243
France	-	282,009	-	-	-	-	-	-
Germany	-	-	-	-	-	-	-	-
Greece	-	37,384	1,000	-	34	-	-	-
Hungary	-	26,218	-	314	-	-	-	-
Ireland	-	-	-	-	-	-	-	-
Italy	185,615	152,633	-	-	-	-	-	-
Latvia	71,799	70,860	1	1	28	28	0	0
Lithuania	-	195,226	-	2	-	0	-	0
Luxembourg	-	-	-	-	-	-	-	-
Malta	-	420	0	0	0	0	0	0
Norway	-	22,500	-	5	-	67	-	-
Poland	882,761	-	-	-	32	-	-	-
Portugal	-	90,292	-	-	-	173	-	-
Slovakia	-	18,312	-	-	-	-	-	-
Slovenia	-	46,736	-	2,373	-	-	-	-
Spain	-	246,862	-	490	-	69	-	-
Sweden	27,905	-	-	-	609	-	-	932
The Netherlands	-	38,358	-	-	-	-	-	-
United Kingdom	-	110,462	-	-	-	-	-	-

Appendix Table PO3a. Animal herd populations, 2004 (cntd.)

2004	Farmed Wild Boars		Gallus gallus		Geese		Goats	
	Herds	Holdings	Flocks	Holdings	Flocks	Holdings	Flocks	Holdings
Austria	-	-	3,987	1,300	-	-	-	10,946
Belgium	-	-	-	2,284	-	8	-	13,736
Cyprus	-	-	23	19	-	-	-	-
Czech Republic	-	-	-	360	-	13	-	731
Denmark	-	-	719	783	-	-	2,632	-
Estonia	-	-	101	59	-	-	-	237
Finland	-	50	-	2,041	-	111	-	1,072
France	-	-	-	-	-	-	-	27,286
Germany	-	-	-	-	-	-	-	-
Greece	170	-	269	224	-	-	22,520	-
Hungary	-	-	3,343	1,605	-	453	-	-
Ireland	-	-	-	-	-	-	-	-
Italy	-	-	-	521,539	-	31,263	-	-
Latvia	-	0	136	28	2	2	1,751	1,751
Lithuania	-	0	-	198,778	-	1	-	3,665
Luxembourg	-	-	-	-	-	-	-	-
Malta	0	0	-	302	0	0	-	1,865
Norway	-	-	-	1,357	-	-	-	1,090
Poland	9	-	211,787	-	14,859	-	14,582	-
Portugal	-	-	-	-	-	-	-	-
Slovakia	-	-	-	-	-	-	-	489
Slovenia	-	-	-	-	-	713	-	3,974
Spain	-	-	-	12,029	-	178	-	84,063
Sweden	-	-	-	-	-	-	518	-
The Netherlands	-	-	-	2,769	-	-	-	4,532
United Kingdom	-	-	-	-	-	-	-	-

Appendix Table PO3b. Animal herd populations, 2004

	Guinea Fowl		Ostriches		Pigs		Rabbits	
	Herds	Holdings	Flocks	Holdings	Herds	Holdings	Herds	Holdings
Austria	-	-	-	-	-	51,265	-	-
Belgium	-	-	-	-	-	10,614	-	-
Cyprus	-	-	-	-	115	115	-	-
Czech Republic	-	-	-	-	-	10,311	-	-
Denmark	-	-	-	-	18,483	-	-	-
Estonia	-	-	-	-	-	374	-	-
Finland	-	-	-	-	-	3,357	-	-
France	-	-	-	-	-	59,549	-	-
Germany	-	-	-	-	-	-	-	-
Greece	-	-	175	-	4,365	-	12,050	-
Hungary	-	-	-	-	-	253,150	-	-
Ireland	-	-	-	-	-	-	-	-
Italy	-	14,532	-	-	195,325	-	-	-
Latvia	-	-	-	-	2,543	2,543	-	-
Lithuania	-	-	-	-	-	169,200	-	-
Luxembourg	-	-	-	-	-	-	-	-
Malta	-	-	-	-	-	157	-	-
Norway	-	-	-	-	-	3,762	-	-
Poland	-	-	-	-	625,392	-	-	-
Portugal	-	-	-	-	-	-	-	-
Slovakia	-	-	-	-	-	6,326	-	-
Slovenia	-	241	-	74	-	39,484	-	-
Spain	-	-	-	-	-	86,572	-	5,499
Sweden	-	-	-	-	3,669	-	-	-
The Netherlands	-	-	-	-	-	10,038	-	-
United Kingdom	-	-	-	-	-	10,375	-	-

Appendix Table PO3b. Animal herd populations, 2004 (cntd.)

	Sheep		Sheep and goats		Solipeds		Turkeys	
	Flocks	Holdings	Herds	Holdings	Herds	Holdings	Flocks	Holdings
Austria	-	16,941	-	-	-	-	246	133
Belgium	-	31,405	-	-	-	-	-	63
Cyprus	-	-	4,173	4,173	-	-	-	-
Czech Republic	-	3,828	-	-	-	7,300	-	118
Denmark	10,617	-	-	-	-	-	50	-
Estonia	-	1,564	-	-	-	-	-	-
Finland	-	-	-	-	-	4,641	-	139
France	-	95,665	-	-	-	-	-	-
Germany	-	-	-	-	-	-	-	-
Greece	64,632	-	39,008	-	30,134	-	35	-
Hungary	-	18,613	-	-	-	-	-	407
Ireland	-	-	-	-	-	-	-	-
Italy	-	-	119,807	-	48,661	-	35,132	-
Latvia	3,454	3,454	-	-	9,252	-	2	2
Lithuania	-	2,630	-	-	-	54,647	-	3
Luxembourg	-	-	-	-	-	-	-	-
Malta	-	1,865	-	-	-	1,946	0	0
Norway	17,439	-	-	-	-	-	-	70
Poland	-	-	-	-	28,000	-	19,544	-
Portugal	-	-	-	70,977	-	-	-	-
Slovakia	-	4,129	-	-	-	-	-	-
Slovenia	-	5,281	-	-	-	4,728	-	1,365
Spain	-	141,984	-	-	-	48,750	-	810
Sweden	7,639	-	-	-	16,310	-	-	1,056
The Netherlands	-	14,396	-	-	-	-	-	92
United Kingdom	-	88,775	-	-	-	-	-	-

Appendix Table RA1. Vaccination programmes for rabies in animals, 2004

Country	Vaccination programmes in pets	Vaccination programmes in wildlife
Austria	-	Since 1991, oral vaccines distributed to foxes twice a year. The programme is approved and co-financed by EU (2003/849/EC).
Belgium	Compulsory vaccination of dogs and cats in the south and if staying at public campgrounds	Oral vaccines were distributed until 2003.
Cyprus	-	-
Czech Republic	Compulsory vaccination of carnevores in captivity	In 1989, oral vaccination of foxes in some districts. In 2003, covers the whole country except for rabies free districts. Since 2004, vaccination twice a year by air in selected areas, mainly along the border with Poland and Slovakia. The programme is approved and will be co-financed by EU (2003/849/EC).
Denmark	-	-
Estonia	Compulsory vaccination of dogs and cats	In 2004, oral vaccines were distributed twice on one island. From 2005, a vaccination programme covering half the country has been approved and will be co-financed by EU.
Finland	Vaccination in dogs and cats is recommended	Since 1991, Oral vaccines distributed to foxes and racoon dogs twice a year along the russian border by flight. Since 2004, twice a year. The programme is approved and co-financed by EU (2003/849/EC).
France	-	Oral vaccines distributed to foxes will start again in 2005.
Germany	-	Oral vaccines distributed to foxes twice a year by flight. The programme is approved and co-financed by EU (2003/849/EC).
Greece	Compulsory vaccination of dogs	-
Hungary	Compulsory vaccination of dogs	Since 2004, oral vaccines distributed to foxes twice a year by flight. The programme started in 1997.
Ireland	-	-
Italy	-	Oral vaccines distributed to foxes in the Region Friuli Venezia Giulia.
Latvia	-	Oral vaccines distributed to foxes twice a year by flight. The programme is approved and co-financed by EU (2003/849/EC).
Lithuania	Compulsory vaccination of dogs and cats	Since 1995, oral vaccines distributed to foxes twice a year by flight.
Luxembourg	-	Oral vaccines distributed to foxes will start in 2005.
Malta	-	-
Norway	Vaccination of dogs and cats being brought in and out of the country	-
Poland	Vaccination programme for dogs since 1949	Since 2002, oral vaccines distributed to foxes twice a year by flight. The programme is approved and co-financed by EU (2003/849/EC).
Portugal	Compulsory vaccination of dogs since 1925	-
Slovakia	Compulsory vaccination of domestic carnivores	Oral vaccines distributed to foxes twice a year by flight. The programme is approved and co-financed by EU (2003/849/EC).
Slovenia	Compulsory vaccination of dogs since 1947	Since 1995, Oral vaccines distributed to foxes twice a year by flight. The programme is approved and co-financed by EU (2003/849/EC).
Spain	-	From 2004, compulsery surveillance according to Directive 03/99/EEC.
Sweden	Vaccination of dogs and cats being brought in and out of the country	-
The Netherlands	-	-
United Kingdom	-	-

Appendix Table RA2. Type of samples and diagnostic methods used when diagnosing rabies in humans and animals, 2004

	Humans		Animals	
	Type of sample	**Diagnostic test**	**Type of sample**	**Diagnostic test**
Austria	Liquor, smears from pharynx, swab from conjuntivae, biopsy at the nape of the neck and serum	FAT, immunohisto-chemistry, RT-PCR	Brain	FAT, mouse inoculation test
Belgium	-	-	Brain	FAT
Cyprus	-	-	Brain	Histopathology
Czech Republic	-	-	Brain	FAT
Denmark	Blood samples, skin biopsy from neck	-	Brain	FAT, Virus isolation
Estonia	-	-	Brain	FAT
Finland	-	Human: cultivation, serology, antigen-test, direct microscopy.	Brain	FAT, cell culture
France	-	-	-	-
Germany	-	-	-	FAT, cell culture
Greece	-	-	-	-
Hungary	Cerebrospinal fluid, blood	Isolation of virus, antigen detection, mouse inoculation method, FAT	-	-
Ireland	-	-	-	-
Italy	-	-	Brain	Flourescent antibody test (FAT), smears
Latvia	-	Elisa	Brain	FAT, mouse inoculation test
Lithuania	Cerebrospinal fluid, saliva	Isolation of virus, antigen detection, mouse inoculation test, ELISA, PCR.	-	-
Luxembourg	-	-	-	-
Malta	-	-	-	-
Norway	Cerebrospinal fluid, salvia, if postmortem: brain tissue	Isolation of virus, antigen detection	Brain	FAT, mouse inoculation test
Poland	Cerebrospinal fluid, saliva	Isolation of virus, antigen detection	-	FAT, mouse inoculation test, RFFIT
Portugal	-	-	-	-
Slovakia	Cerebrospinal fluid, saliva	Isolation of virus, antigen detection	-	FAT, ELISA, PCR, FAVN
Slovenia	-	-	-	-
Spain	-	-	Brain tissue/ blood	FAT, ELISA
Sweden	-	Serology, antigen detection, isolation of virus	Brain tissue	FAT, mouse inoculation test
The Netherlands	-	-	-	-
United Kingdom	-	-	-	FAT, mouse inoculation test, histology, PCR

Appendix Table RA3. Notification of rabies in humans and animals, and Official Rabies Free status, 2004

	Notifiable in humans since	Notifiable in animals since	Official Rabies Free Status (ORF)
Austria	1947	1957	
Belgium	<1999	1883	ORF by WHO recommendation (2001)
Cyprus	2004	yes	Rabies free
Czech Republic	yes	1999	
Denmark	1964	1920	
Estonia	1946	1950	
Finland	1995	1922	ORF by WHO recommendation (1991), considered free in accordance to OIE
France	yes	yes	ORF by OIE (2001)
Germany	yes	yes	
Greece	yes	1936	Rabies free
Hungary	1950	1928	
Ireland	1976	-	ORF by OIE
Italy	1990	1954	
Latvia	1974	yes	
Lithuania	1957	<1975	
Luxembourg	-	-	ORF by OIE (2003)
Malta	-	-	Rabies free since 1911
Norway	1975	1965	The mainland is ORF by OIE
Poland	-	1927	
Portugal	-	yes	
Slovakia	yes	yes	
Slovenia	1949	1991[1]	
Spain	1901	1952	The mainland and islands are considered rabies free
Sweden	<1975	yes	Rabies free since 1886
The Netherlands	yes	yes (dogs)	
United Kingdom	yes	yes	ORF by OIE

1. In Slovenia, the year of independence, however, this disease was notifiable before 1991.

Appendix Table SA1. Surveillance systems on *Salmonella* in feedingstuffs, 2004

Country	Surveillance compulsory	Domestic raw feed material		Imported raw feed material (EU and Non-EU countries)	
		Animal	Vegetable	Animal	Vegetable
Austria	Yes	Each farm, processing plant and retailer are sampled at least twice per year		Each farm, processing plant and retailer are sampled at least twice per year	
Belgium	Yes	Official monitoring		-	-
Cyprus	-	-	-	-	-
Czech Republic	-	-	-	-	-
Denmark	Yes	Targeted sampling	Targeted sampling	Targeted sampling	Targeted sampling
Estonia	Yes	Monitoring	Monitoring	-	-
Finland	Yes	Self control systems based on requirements of legislation		Random sampling	Every consign-ment is sampled
-	-	-	-	Non-EU: 2 samples per 50.000 kg in every bulk, truck, container	
France	-	Monitoring plad 5/97-5/98, number of samples determined in proportion to tonnage used		-	-
Germany	Yes	-	-	Samples are taken by official labs. At least 25 samples per batch	-
Greece	-	Targeted and routine sampling	Targeted and routine sampling	-	-
Hungary	-	-	-	-	-
Ireland	Yes	Compulsory sampling regime drawn up in accordance with Council Directive 95/53/EC		Compulsory sampling regime drawn up in accordance with Council Directive 95/53/EC	
Italy	Yes	-	Official control as well as HACCP or own check by the industry	-	-
Latvia	No	HACCP or own check by the industry		-	-
Lithuania	-	-	-	-	-
Luxembourg	-	-	-	-	-
Malta	-	-	-	-	-
Norway	Yes	Own check programme based on requirements of legislation. Random sampling by the official surveillance programme		Controlled at Border Inspection Posts (predominantly pet feed)	x
Poland	-	-	-	-	-
Portugal	-	-	-	-	-
Slovakia	-	-	-	-	-
Slovenia	Yes	Official target sampling and own check programme based on HACCP by the industry		Official target sampling and own check programme based on HACCP by the industry	
Spain	Yes	Monitoring	Monitoring	-	-

x -: routinely performed.

Appendix Table SA1. Surveillance systems on *Salmonella* in feedingstuffs, 2004 (cntd.)

Country	Process control	Compound feed		
		Cattle	Pig	Poultry
Austria	x	Each farm, processing plant and retailer are sampled at least twice per year		
Belgium	-	x	x	x
Cyprus	-	-	-	-
Czech Republic	-	-	-	-
Denmark	Targeted sampling	-	-	-
Estonia	-	Monitoring	Monitoring	Monitoring
Finland	x	Self control systems based on requirements of legislation. Final products: random official sampling		
-	-	-	-	-
France	-	1/10 000 tons, monitoring plan 97/98		
Germany	-	-	-	-
Greece	-	-	-	ISO 6571, ISO 6580 (Broilers)
Hungary	-	-	-	-
Ireland	-	x	x	x
Italy	-	Official control as well as HACCP or own check by the industry		
Latvia	HACCP or own check by the industry	HACCP or own check by the industry		
Lithuania	-	-	-	-
Luxembourg	-	-	-	-
Malta	-	-	-	-
Norway	Own check programme based on HACCP by the industry	All complete feedingstuffs must be subject to heat treatment[2]		
Poland	-	-	-	-
Portugal	-	-		
Slovakia	-	-	-	-
Slovenia	Official target sampling and own check programme based on HACCP by the industry	-	-	-
Spain	-	Monitoring	Monitoring	Monitoring

x -: routinely performed.
2. In Norway, establishments producing feed are required to establish own check programme based on HACCP. In addition, random samples are collected through an official surveillance programme.

Appendix Table SA1. Surveillance systems on *Salmonella* in feedingstuffs, 2004 (cntd.)

Country	Surveillance compulsory	Domestic raw feed material		Imported raw feed material (EU and Non-EU countries)	
		Animal	**Vegetable**	**Animal**	**Vegetable**
Spain	Yes	Monitoring	Monitoring	-	-
Sweden	Yes	All consignments have to be sampled		All consignments have to be sampled	
The Netherlands	Yes	Own control		-	-
United Kingdom (Great Britain)	-	Sampling of rendered material is required if the rendered material is intended for use in livestock feedingstuffs; reportable		Tested according to a risk assessment	-
United Kingdom (Northern Ireland)	-	-		x	-

x -: routinely performed.

Appendix Table SA1. Surveillance systems on *Salmonella* in feedingstuffs, 2004 (cntd.)

Country	Process control	Compound feed		
		Cattle	**Pig**	**Poultry**
Spain	-	Monitoring	Monitoring	Monitoring
Sweden	Own check programme based on the HACCP principles[1] and official targeted control	All consignments have to be sampled		
The Netherlands	-	Routine testing	-	-
United Kingdom (Great Britain)	Codes of practice for control is applied as part of the HACCP process	x	x	x
United Kingdom (Northern Ireland)	-	x	x	x

x -: routinely performed.

1. In Sweden, feed mills producing feedingstuffs for poultry a minimum of five samples per week, feed mills producing feedingstuffs for ruminants, pigs or horses two samples a week.

Appendix Table SA2. *Salmonella* monitoring programmes in poultry breeders *(Gallus gallus)*, 2004

Countries, running a monitoring or control programme described in the Directive 92/117/EEC

Follow the Directive	A, CZ[1], DK, D, FIN, F, GR, IRL, I, LV, N, NL, P, S, SK, SLO, ES, UK
For additional sampling see Table SA3	DK, FIN, F, N, NL, S, UK
Sampling of day-old chicks for egg production is voluntary	P

Requirement according to Directive 92/117/EEC

	Day old chicks	Rearing period		Production period	
	Dead chickens/ destroyed chickens (20)	4 weeks	faecal samples (60)	Every 2 weeks	dead chickens (50) or
	Samples from the incide of the delivery boxes (internal lining/ paper/crate material)	2 weeks before moving	faecal samples (60)	Official sampling every 8 weeks	meconium samples (250)

Countries running a monitoring or control programme using a sampling scheme based on Directive 92/117/EEC

Belgium	Inner lining of delivery boxes and blood	age of 16 weeks	Faecal samples (60)	Every 6 weeks (60)	Faecal samples at farm
	(all: domestic and imported)	- all flocks	litter	4 times a year	*Salmonella* control: dead in shell chicks, fluff, meconium (pooled samples)
		- imported reared hens and cocks	pooled faecal samples		
				4 times a year	Hygiene control of hatcheries
				Before arrival at slaughterhouse (2 weeks before slaughter)	60 faecal samples
Estonia	Egg production: Meconium (250 chicks) or 50 dead chicks. Meat production: Dead chicks and inner lining of delevery boxes (10/flock or batch)	5-6 weeks or 2 weeks (flocks for egg production, 3 weeks (flocks for meat production) before moving	Faecal samples (number of samples depend on flock size)	20-24 weeks and 98-104 weeks	Faecal samples (number of samples depend on flock size)

Diagnostic methods used

ISO 6579:2002	B, CR, DK, EST, GR, I, LV, PL, SK, SLO, ES, NL,
NMKL No 71:1999	N, S
Modified ISO 6579:2002	UK
ISO 6580	GR
AFNOR NF U 47 100 and 47 101	F

Countries not providing detailed information about monitoring programmes

No information available	CY, LT, M
Directive 92/117/EEC is the basis for the compulsery control of *S.* Enteritidis and *S.* Typhimurium in breeding flocks and in hactheries	H
Luxembourg does not have any breeding flocks	L
A monitoring programme is running in the Beira Litoral region	P

1. In Czech Republic, number of faecal samples collected in the rearing and production period depend on flock size. During the production period no dead chicks or meconium samples are collected.

Appendix Table SA3. ***Salmonella*** **monitoring programmes in poultry breeders** ***(Gallus gallus)*****, 2004 – additional sampling**

	Day old chicks	Rearing period		Production period	
Austria		At week 12	Faecal samples (60)	Every 4 weeks	Boot swabs
Denmark		1 week	Dead chickens (40)	Every week	2 pairs of sock samples
		2 and 8 weeks	2 pair sock samples[1]	Hatcheries: after each hatch (1-4 hatchers may be pooled)	At least 25g wet dust per hatcher
		2 weeks before moving	Blood samples (60)		
France	Meconium	2 weeks before moving	Gauze swabs	At 2 weeks interval	Internal linings of hatchery boxes
				Every 8 weeks	Faecal samples on holdings
Finland				At 2 weeks interval	Internal linings of hatchery boxes
				Every 8 weeks	Faecal samples on holdings
Norway		Grandparents: 1-2, 4 and 9-11 weeks	Faecal samples (60)	Grandparents: At hatchery: every 2 weeks. At farm: Every 4 weeks	At hatchery: Meconium (250). At farm: faecal samples (60)
				Parents: At hatchery: every 2 weeks	
The Netherlands	Leaflets (40)	max.21 d before transfer	Cloacal swabs (150)	From 20 weeks every 4 weeks	Cloacal swabs, 6x25/flock
				Hatchery	Fluff samples (25g)/ hatching entity
	Leaflets (40)	4 weeks	Cloacal swabs (60)	From 20-22 weeks or 22-24 weeks every 9 weeks	
		max.21 d before transfer	Cloacal swabs (150)	No vaccination	Blood samples 1% of flock (30-60)/flock
		Decision on vaccination		Vaccination	Cloacal swabs, 6x25/flock
				From week 26 and on	Fluff samples, every hatch, every machine
Sweden		Grandparents: 1-2 and 9-11 weeks	Dead chicks (10) and faecal samples (60)	Every month	Faecal samples (60)
UK	Grandparents supply flocks: Every week, official samples every 4 weeks. Grandparents: Every week, Official sampling every 4 weeks				
	Parent supply flocks: Every 2 weeks, official samples every 8 weeks				

1. A “sock-sample“ consists of elastic cotton tubes pulled over the collector’s boots. While walking through the poultry house, the cotton tubes absorb faecal droppings. Two pairs of “sock-samples” analysed as one pool has shown to be just as effective in detecting *Salmonella* as 60 faecal samples. In addition, the sampling method is easier to perform.

Appendix Table SA4. Control measures taken in poultry breeder flocks in case of *Salmonella* infection, 2004

Serovars covered	
All Serovars	A, DK, FIN, S[1], N[1], NL
S. Enteritidis and *S.* Typhimurium	EST[5], F, D, IRL, UK, E, EL, N-IRL
Restrictions on the flock	
After confirmation	A, LV, NL, N-IRL, PL
Immediately following suspicion	A, DK, EST, F, FIN, S, N, IRL, SLO, UK
Chicks already delivered covered by restrictions	N
Consequence for the flock	
Treatment	SLO
Slaughter	B, DK, GR, F, IRL, N-IRL, PL, UK
Restrictions for the delivery of hatching eggs	A[2], B[4], EL, F, LV[4], N, NL, DK[2], PL[4], SLO
Slaughter and heat treatment	A, D, FIN, NL[3]
Destruction	S, N
Other consequences	
Feedingstuffs are restricted (heat treatment or destruction)	S, DK, SLO
Disposal of manure restricted	F, FIN, N, S, UK, DK, PL, SLO
Cleaning and disinfection	
Obligatory	A, B, DK, EST, F, FIN, S, IRL, N, NL, PL, SLO, UK
Negative bacteriological result required before restocking	A, DK, EST, F, FIN, IRL, N, NL, SLO, S, UK
Requirement of an empty period	A (14 days), F (lower than 30 days), N (30 days)
Further investigations	
Epidemiological investigation is always started	FIN, F, N, S, IRL, NL, UK, N-IRL
Feed suppliers are always included in the investigation	FIN, N, S, IRL, NL, UK
Contact herds are included in the investigation	FIN, F, IRL, N, NL, S, UK
Vaccination	
Mandatory	A
Recommended	B
Permitted	CY, DK[6], SLO, ES, UK
Prohibited	EST, FIN, LV, N, S,

1. In Norway and Sweden, for invasive serovars and non-invasive serovars different control strategies are applied.
2. Destruction of the hatching eggs.
3. In the Netherlands, only flocks that are positive for *S.* Enteritidis or *S.* Typhimurium are obligatory slaughtered.
4. Destruction of incubated eggs, not yet incubated eggs may be pasteurised.
5. In Estonia, additional serotypes: *S.* Dublin, *S.* Newport, *S.* Choleraesuis.
6. In Denmark, no vaccination occurs, as no vaccinations have been approved by The Danish Veterinary and Food Administration.

Appendix Table SA5. *Salmonella* monitoring programmes in laying hens *(Gallus gallus)* producing table eggs, 2004

Day old chicks		Rearing period	
Type of sample			
Samples from the incide of the delivery boxes; internal lining/paper/crate material	CZ (10), DK (10), F, LV, PL, SLO[8], S	Faecal samples	CZ[10], DK[1,2], EST[10], FIN (60), F (60), LV, N (60), NL (24-60), PL, SK, S (90)[5]
Dead chickens	A (50,)CZ (max 60), DK (20), EST (50), GR, LV, SK, SLO[8], S (10), UK	Blood samples	DK[2], NL (24-60)[10]
Meconium	A (250), EST (250), F, PL, SK, S (250), UK	sock samples (2) and dust swab (1)	F
Fluff, environmental samples and others	UK	Faecal swabs (26-60)	IRL[10]
		Sock/boot swabs	PL
		Dead chicks or faecal/ bedding sample	SLO[8]
Frequency of sampling			
Each delivery	DK, LV, SK, SLO, UK[9]	At 3 weeks/12 weeks	DK
Every flock	CZ, F, S	At 4 weeks and 2 weeks before transfer	N, SK,
Voluntary	PL	At 5-6 weeks and 2 weeks before transfer	EST
		At 2 weeks before transfer	FIN, F, LV, PL, S
		Max 21 days before transfer	NL
		At 8 and 16 weeks	SLO[7]
		Monthly private 6	IRL
		At 4 weeks	CZ
Diagnostic methods used through out the production			
ISO 6579 (2002)		A,B, CZ, EST, FIN, GR, I, LV, PL, SK, ES	
NMKL No 71:1999		FIN, N, S	
AFNOR NF 47 100 and 47 101		F	
The method described in the O.I.E. manual, 5th ed., 2004		SLO	
Buffered Peptone water		P	
Various bacteriological		DK, LT, UK	
No information		CY, D, H, IRL, L, M	
Strategies in countries with no official sampling strategies, 2004			
Have voluntary sampling		A	
Farms >5000 birds are required to sample 3 weeks prior to slaughter. Faecal samples (60) are taken with swabs/by hand or boot swabs (2)		B	
No sampling strategies		I, P[11], ES	
Sampling of day old chicks as the monitoring procedure for layer breeder parent flocks		UK	

Appendix Table SA5. ***Salmonella*** **monitoring programmes in laying hens *(Gallus gallus)* producing table eggs, 2004 (cntd.)**

Production period		Before slaughter at the farm	
Type of sample			
Faecal samples	A, (60), CZ[10], DK, EST[10], FIN (60), LV, N (60), PL, SK, S (60-90)[5]	Faecal samples (60)	B, FIN, F, N
Egg samples[10], and sock samples (2) or faecal samples (60)	DK	Faecal samples	EST[10], PL, SK, S (60 or 90)
Feacal samples (60), or swabs/sock samples (2) and dust swab (1)	F	Swabs (at)	A, B, IRL
Dust swabs (26-60)	IRL[10]	Sock/boot swabs	PL
Blood samples and faecal samples (vaccination)	NL (24-60)[10]		
Sock/boot swabs	PL		
Dead chicks or faecal/ bedding sample	SLO		
Frequency of sampling			
Every 9 weeks[3] or 3 times[4]	DK	Prior to slaughter	B, F, FIN, N
Three times	FIN[3]	2-4 weeks before to slaughter	S
At 25 - 30 and 48 - 52 weeks	N, S[5]	4 weeks before slaughter	LV
At 30 and 50 weeks	LV	1-2 weeks before slaughter	PL
At 20-24 weeks and 98-104 weeks	EST	2 weeks before slaughter	EST
At 24, 40 and 55 weeks	F		
Max 9 weeks before slaughter	NL		
Every 15-20 weeks	PL		
Every 2 weeks	SK		
Once yearly official and monthly private[6]	IRL		
Every 12 weeks, 60 feacal samples	A		
Every 12 weeks	CZ		

Note: Monitoring is not compulsory by Directive 92/117/EEC.
"()": numbers in brackets are number of samples taken.
1. In Denmark, at 3 weeks: 5 pairs of socks or 300 faecal samples. Flocks<200 animals: 2 pairs of sock samples or 60 faecal samples.
2. In Denmark, at 12 weeks: Flock >500 animals: 60 blood samples, and 5 pairs of socks or 300 faecal samples. Flocks with 200-499 animals: 55 blood samples and 5 pairs of sock sample. Flocks<200 animals: Blood samples, and 2 pairs of sock samples or 60 fa.
3. In Denmark, for eggs sold to authorised egg-packing stations.
4. In Denmark, for eggs sold at barn-yard sale or hobby poultry keeping.
5. In Sweden, samples are collected from all holdings placing eggs on the market and holdings>200 layers not placing eggs on the market.
6. In Ireland, routine as part of National *Salmonella* Monitoring scheme.
7. In Slovenia, only holdings with more than 200 laying hens.
8. In Slovenia, additional samples will be collected any time in case of more than 0.5% mortality per day.
9. In UK, every 2 weeks by operator at hatchery, and officially every 8 weeks at hatchery as the monitoring procedure for layer breeder parent flocks.
10. Number of samples depend on flock size.
11. In Portugal, a surveillance programme is running in one region (Beira Lotoral).

Appendix Table SA6. Measures taken in laying hens *(Gallus gallus)* producing table eggs in case of *Salmonella* infections, 2004

Serovars covered	
All Serovars	DK, FIN, N[1], S[1]
S. Enteritidis and *S.* Typhimurium	CZ, EST, F[6], NL, IRL, PL, SK
Restrictions on the flock	
Immediately following suspicion	DK, EST, F, FIN, IRL, N, NL, PL, SLO, S
Eggs covered by restrictions already on the basis of suspicion	DK, F, FIN, IRL, N, NL, PL, S
Consequence for the flock	
Recovery or slaughter	I
Slaughtered	GR, IRL[5], PL, SK
Slaughtered and heat treated	FIN, S[3]
Sanitary slaughter	F, N[3]
Destruction	CY, CZ, DK, N[2], S[2]
Slaughter or destruction	EST
Treatment with antibiotics	A[3], CZ, EST, PL, SLO
Consequence for the table eggs	
Destruction	CY, EST, N[2], FIN[2], S[2]
Heat treatment (pasteurisation)	A, B, CZ, DK, F, FIN[3], IRL[4], NL[4], S[3]
Destruction or heat treatment	N[3], PL, SK
Other consequences	
Feedingstuffs are restricted (heat treatment or destruction)	DK, EST, FIN, SLO, S
Disposal of manure restricted	EST, FIN, N, PL, SK, SLO, S
Cleaning and disinfection	
Obligatory	B, EST, F, FIN, DK, IRL, N, NL, PL, SK, SLO, S
Negative bacteriological result required before restocking	F, FIN, IRL, N, NL, DK, SLO, S
Requirement of an empty period	F, N (30 days)
Further investigations	
Epidemiological investigation is always started	EST, F, FIN, IRL, N, NL, S, UK
Feed suppliers are always included in the investigation	EST, FIN, IRL, N, NL, S
Contact herds are included in the investigation	EST, FIN, IRL, N, NL, S
Intensification of the examination of non-infected flocks on the same farm	DK, F, IRL, N, NL, S
Vaccination	
Mandatory	H
Recommended	A[8], B
Permitted	DK[7], CZ, F, SK, ES[9], UK
Prohibited	EST, FIN, LV, N, S

Note: No measures are fixed in Directive 92/117/EEC.
1. In Norway and Sweden, for invasive serovars and non-invasive serovars different control strategies are applied. However, this is not practised in Sweden.
2. Invasive *Salmonella*.
3. Non-invasive *Salmonella*.
4. Eggs are pasteurised until the flock is destroyed.
5. In Ireland, as agreed with industry as part of *Salmonella* Control programme and as a condition of National Egg Quality Assurance Scheme.
6. In France, during the rearing period, *S.* Typhimurium and *S.* Enteritidis are included. During the table egg production period in holdings placing their eggs on the market via an egg packing centre, only *S.* Enteritidis is included.
7. In Denmark, no vaccination occurs, as no vaccines have been approved by The Danish Veterinary and Food Administration.
8. In Austria, vaccination against *S.* Enteritidis recommended.
9. In Spain, only in rearing period.

Appendix Table SA7. *Salmonella* monitoring programmes in broiler flocks *(Gallus gallus)*, 2004

Day old chicks		Before slaughter at farm		At slaughter (flock based approach)	
Type of sample					
Samples from the incide of the delivery boxes, internal lining/ paper/crate material	DK (10), EST (10), PL, S (10)	Faecal samples	FIN (60), LV, N (60), SK, S (30 or 60)[1], UK[4]	Neck skin samples	N (≥1), S (4000/ year), UK[1]
Dead chicks	A (50), DK (20), EST, SK, S (20), UK	Sock samples	DK (5), UK[1]	Cloacal swabs (30), caecum (1)	I[5]
Leaflets (40)	NL	Faecal samples or sock samples	B (60 or 2), NL (60 or 2), PL		
Dust (at hatchery)	DK	Cloacal swabs	A(9)[2]	Caecum swabs (30)/flock and breast skin (1)/batch	NL
Meconium	A (250), PL, SK, S (250), UK	Faecal samples or cloacal swabs	EST[1]		
		Bedding	SLO		
		Ceaca (30) or organs (10)	S[1]		
		Dust swabs	F		
Frequency of sampling					
Each delivery	DK, SK	At 5-6 weeks	EST		
Each batch	NL, EST	3 weeks before slaughter	A, B[6]	Each flock	I[5], N
Each flock	S	2-3 weeks before slaughter	DK	Each flock/batch	NL, UK
Every 2 week at hatchery, every 8 weeks official sampling	A, UK	1-2 weeks before slaughter	EST, S, PL, UK[3]		
		1 week before slaughter	LV		
		1-3 weeks before slaughter	N		
		Twice a year and at least 3 weeks before slaughter	SLO		

Note: Monitoring is not compulsory by Directive 92/117/EEC.
In this table priority is given to farm based approaches; sample based approaches at slaughterhouse may be described in Table SA9.
"()": Numbers in brackets are number of samples taken.
1. Number of samples depend on flock size.
2 In Austria, broilers and spent hens.
3 In UK, private sampling.
4. In UK, the industry commonly tests flocks one to two weeks before slaughter.
5. In Italy, a monitoring programme is running in the Veneto Region of Italy.
6. In Belgium, only farms >5000 birds are required to sample.

Appendix Table SA7. *Salmonella* monitoring programmes in broiler flocks *(Gallus gallus)*, 2004 (cntd.)

Diagnostic methods	
ISO 6579 (2002)	B, EST, FIN, GR, LV, PL, SK, UK
Modified ISO 6579 (2002)	A
Various bacteriological methods	DK, LT, UK
NMKL No 71:1999	FIN, N, S
Method in accordance with the O.I.E. manual, 5th ed., 2004	SLO
Strategies in countries with no official monitoring, 2004	
No official sampling strategies	CZ, ES
Private monitoring: 2500 neckskin samples/house/year and carcass sampling at the slaughterhouse	I
A monitoring programme is running in the Beira Litoral region	P

Note: Monitoring is not compulsory by Directive 92/117/EEC.
In this table priority is given to farm based approaches; sample based approaches at slaughterhouse may be described in Table SA9.

Appendix Table SA8. Measures taken in broilers *(Gallus gallus)* in case of *Salmonella* infections, 2004

Serovars covered	
All Serovars	A, DK, FIN, S[1], N[1], NL
S. Enteritidis and *S.* Typhimurium	EST, IRL, LV, SK, UK
Restrictions on the flock	
Immediately following suspicion	DK, EST, FIN, LV, N, NL, SLO, S
Consequence for the flock	
Slaughter	SK
Slaughtered and heat treated	A, FIN, S[1]
Sanitary slaughter	B, DK, IRL, LV, N[3], NL, UK-IRL
Destruction	FIN, LV, N[2], S[2]
Slaughter or destruction	EST
Treatment with antibiotics	A, (EST), SLO
Other consequence	
Feedingstuffs are restricted (heat treatment or destruction)	EST, S, SLO
Disposal of manure restricted	EST, FIN, LV, N, SK, SLO, S
Cleaning and disinfection	
Obligatory	A, DK, EST, FIN, LV, N, NL, SLO, S
Negative bacteriological result required before restocking	DK, EST, FIN, NL, N, SLO, S
Requirement of an empty period	A (14 days), N (30 days)
Further investigations	
Epidemiological investigation is always started	EST, FIN, IRL, N, S, UK-GB
Feed suppliers are always included in the investigation	EST, FIN, IRL, N, NL, S
Contact herds are included in the investigation	EST, FIN, N, S
Breeding flock that contributed to the hatch will be traced	IRL, N, NL, UK, S
Vaccination	
Mandatory	
Recommended	
Permitted	A, CZ, DK[4], SK, UK
Prohibited	EST, FIN, LV, N, S

Note: No measures fixed in Directive 92/117/EEC.

1. In Norway and Sweden, for invasive serovars and non-invasive serovars different control strategies are applied.
2. Invasive *Salmonella.*
3. Non-invasive *Salmonella.*
4. In Denmark, no vaccination occurs, as no vacines have been approved by The Danish Veterinary and Food Administration.

Appendix Table SA9. *Salmonella* monitoring programmes in broilers and poultry meat products *(Gallus gallus)*, 2004

Slaughterhouse and cutting plant		Processing plants		Poultry meat and meat products at retail	
Type of sample					
Neck skin samples	B[6] (100-300/ matrix), CZ (15), IRL, N (Slaughter-house), S[1]	Depend on survey or own-control plans	DK[3], S[3]	Depend on survey or own-control plans	DK[3], S[3]
Cuts of meat (close to packaging)	DK[9]	Fresh meat, minced meat, final products	EST, LV	Fresh meat	B[6] (100-300/ matrix), NL, SLO (100/ year)[5]
Fresh meat	LV, SLO	Final product	CZ, IRL (twice per year)	Fresh meat, final products	EST, LV
Carcass swabs	IRL	Fresh meat	IRL, N[7]	Final product	CZ, D
At cutting plants: Crushed meat samples[4]	FIN[1], N[1], S[1]	HACCP	A, CZ, I, SLO	Survey – whole chickens	UK[2]
Neck skin samples, cuts of meat, scrap cuttings	EST			Environmental samples	EST
Chicken breasts, cutting meat, minced meat	B[6] (100-300/matrix)			HACCP	A, CZ, I, SLO
Breast skin samples	NL				
HACCP	A, CZ, I, SLO				
Frequency					
Weekly	B, CZ	Weekly	CZ	Random and continuous	CZ, EST
All flocks	IRL	Surveys or own-control	DK[3], S[3]	Survey or own-control	DK[3], S[3]
Every batch	DK[8], N (slaugh-terhouse)	20% of consignments from EEA, all consignments from third country	N[7]	Monitoring	D, IRL
Random and continuous	EST, FIN	Random and continuous	EST	Yearly monitoring	NL
Continuous	LV	Continuous	LV	Continuous	LV, UK
Monthly	SLO	Routine	IRL	February-June	SLO
Daily in major slaughterhouses	S				

Note: Monitoring is not compulsory by Directive 92/117/EEC.
In this table priority is given to sample based approaches; farm based approaches at slaughterhouse may be described in Table SA7.
"()": Numbers in brackets are number of samples taken.
1. Sample size and frequency depend on slaughterhouse or cutting plant capacity.
2. In UK, survey from Wales and Northern Ireland.
3. Sampling by local authorities.
4. Samples collected from cleaning tools, tables etc.
5. In Slovenia, monitoring is based on results from previous years. Samples are collected proportional with the human population in the country.
6. In Belgium, a monitoring programme based on matrixes of carcasses, meat preparation and fillets of broilers was carried out in 2004.
7. In Norway, only imported meat are sampled.
8. In Denmark, a batch is defined as the meat from animals slaughtered between two cleanings and disinfections of the processing equipment.
9. In Denmark, ante-mortem negative batches: 4 pools of 10 samples of cuts of meat. Ante-mortem positive batches: 12 pools of 5 samples of cuts of meat.

Appendix Table SA9. *Salmonella* monitoring programmes in broilers and poultry meat products *(Gallus gallus)*, 2004 (cntd.)

Diagnostic methods

Modified ISO 6579:1999	A, D, I
ISO 17025	B, I
Belgian official method SP-VG-M002	B
ISO 6579:2002	CZ, EST, FIN, I, LV, SLO, S
Depend on the laboratory and/or survey	DK
NMKL No 71:1999	EST, FIN, N, S
Any approved method according to Comm. Decision 2003/470	S

Note: Monitoring is not compulsory by Directive 92/117/EEC.
In this table priority is given to sample based approaches; farm based approaches at slaughterhouse may be described in Table SA7.

Appendix Table SA10. *Salmonella* monitoring programmes in turkey breeders, 2004

Day old chicks		Rearing period			Production period		
Sampling scheme following the provisions of Directive 92/117/EEC							
Dead chickens/ destroyed chickens	LV, N(20), PL (20), SK(20), S (10)	4 and 2 weeks before moving	Faecal samples	FIN (60), LV, N (60), PL (60), SK (60)	Every 2 weeks	Dead chickens (50)	PL, SK
Samples from the internal linings of the delivery boxes	FIN (10), LV, N, PL, SK, S	4 and 2 weeks before moving	Faecal samples (60), caecal samples (10)	S	Every 2 weeks	Meconium samples at the hatchery (250) or dead chickens (10-50)	N
Meconium	S (250)				Every 2 weeks	Faecal samples	LV[4]
					Every month	Faecal samples (60), caecal samples (10)	S
					Official sampling every 8 weeks	Meconium samples at the hatchery (250)	LV[3], PL, SK, S
					At hatchery: every 2 weeks	Samples from the internal linings of the delivery boxes	FIN (5)
					At holding: every 8 weeks	Faecal samples	FIN (60)
Other schemes							
Swabs/faeces	CZ[1]		Swabs/faeces	CZ[1]		Swabs/faeces	CZ[1]
Internal lining papers of delivery boxes (5)	F	Every 4 weeks	On farm: Faecal and litter samples (60), dust swab[2] (1)	F	Every 4 weeks	On farm: Faecal and litter samples (60), dust swab[2] (1)	F
Samples from the lorry and max 1 week after arrival: Wooswool samples	NL	5 weeks, 26 weeks	Cloacal swabs or coecal droppings, 30/flock	NL	Every 4 weeks	In hatchery: Environmental swab[5] (1)	F
Sample scheme approved by EU (Decision 96/389/EC)	IRL	Sample scheme approved by EU (Decision 96/389/EC)		IRL	Every 4 weeks 30 coecal droppings or stocking samples	Faecal samples	NL
					Hatchery, every hatch, every machine	Fluff samples every hatch	NL
					Sample scheme approved by EU (Decision 96/389/EC)		IRL
					Hatchery	Samples of imported eggs	A

"()": Number in brackets represent number of samples.
1. In Czech Rep., only clinically ill or suspected animals are sampled.
2. In France, 1 gauze swab (the sampling method consists in wiping 5 different sites of the poultry house).
3. In Latvia, breeding flocks whose eggs are hatched at a hatchery with a total incubator capacity of 1000 eggs or more.
4. In Latvia, breeding flocks whose eggs are hatched at a hatchery with a total incubator capacity of less than 1000 eggs.
5. In France, 1 gauze swab (the sampling method consists in wiping the wall of the hatching cabinets or the lining pads of 5 different hatching trays).

Appendix Table SA10. *Salmonella* monitoring programmes in turkey breeders, 2004

Diagnostic methods used	
ISO 6579:2002	CZ, FIN, LV, PL
NMKL No 71:1999	FIN, N, S
Countries not providing detailed information about monitoring programmes	
No information available	CY, F, D, GR, H, IRL, LT, L, M, P, SLO, ES
No official surveillance programme	B, CZ, DK, I, NL, UK
No turkey breeder flocks present	A, EST

"()": Number in brackets represent number of samples.
1. In Czech Rep., only clinically ill or suspected animals are sampled.
2. In France, 1 gauze swab (the sampling method consists in wiping 5 different sites of the poultry house).
3. In Latvia, breeding flocks whose eggs are hatched at a hatchery with a total incubator capacity of 1000 eggs or more.
4. In Latvia, breeding flocks whose eggs are hatched at a hatchery with a total incubator capacity of less than 1000 eggs.
5. In France, 1 gauze swab (the sampling method consists in wiping the wall of the hatching cabinets or the lining pads of 5 different hatching trays).

Appendix Table SA11. *Salmonella* monitoring programmes in turkeys – production level, 2004

Day old chicks		**Rearing period and before slaughter (related to the flock)**		**At slaughter (related to the flock)**	
Type of sample					
Litter samples	NL	Faecal samples	FIN (60), N (60), NL, S (90)	Neck skin samples	N, IRL[3], S
Dust/fluff	IRL	Sock samples	DK (5)[2]	Cloacal swabs (30) and caecum (1)	I[5]
Sampling based on the directive	PL	Sampling based on the directive	PL	Carcasses (1 flock per cycle=205 per annum)	IRL
Swabs/faeces	CZ[1]	Cloacal swabs	A (9)	Swabs/faeces	CZ[1]
		Swabs/faeces	CZ[1]		
		Dust swabs	F		
Frequency of sampling					
Every two months	IRL	2-3 weeks before slaughter	DK[2]		
		1-2 weeks before slaughter	S, PL		
		Every flock	FIN		
		Max 3 weeks before slaughter	A		
		1-3 weeks before slaughter	N		
		Max 4 weeks before slaughter	NL		
Diagnostic methods used					
ISO 6579:2002		CZ, FIN, LV, PL			
NMKL No 71:1999		FIN, N, S			
Modified ISO 6579:2002		A			
Countries not providing detailed information about monitoring programmes					
No information available		A, CY, D, GR, H, LT, L, M, P, SK, SLO, ES			
No official surveillance programme		B, CZ, I, UK			
No turkey production flocks present		EST			

Note: In this table priority is given to farm based approaches; sample based approaches at slaughterhouse may be described in Table SA12.
“()”: Numbers in brackets are number of samples.
1. In Czech Rep., only clinically ill or suspected animals are sampled.
2. In Denmark, since March 2004 turkeys are no longer slaughtered, as the only major turkey slaughterhouse closed.
3. In Ireland, private samples by individual plants.

Appendix Table SA12. ***Salmonella*** **monitoring programmes in turkey meat and turkey meat products, 2004**

Turkeys at slaughter and at cutting plants		Processing plants		Turkey meat and meat products at retail	
Type of sample					
Carcasses	IRL	Crushed meat	FIN[2], N[4], S[4]	Routine sampling	IRL
Cuts of meat (batches close to packing)	DK[1]	Depend on survey	DK6	Depend on survey	DK[6], S[6]
Fresh meat	FIN[2], 4, LV, SLO	Fresh meat, minced meat, final products	LV	Fresh meat, final products	EST, LV
Neck skin samples	CZ (15), S, IRL, N[4]	Final product	CZ, IRL	Environmental samples	EST
HACCP	A, CZ, I, SLO	HACCP	A, CZ, I, SLO	Fresh meat	SLO (100/ year)[3]
				Final product	CZ, D
				HACCP	A, CZ, I, SLO
Frequency					
Every Batch	DK[5], N	Twice yearly	IRL	Surveys	DK
Weekly	CZ	Weekly	CZ	Random and continuous	CZ, EST
Random	FIN	Surveys	DK	Continuous	LV
Continuous	LV	Continuous	LV	Monitoring	D
Monthly	SLO			February-March	SLO
Daily on major slaughterhouses	S				
Diagnostic methods					
Modified ISO 6579:1999		A, D, I			
ISO 6579:2002		CZ, EST, FIN, I, LV, SLO			
Depend on the laboratory and/or survey		DK			
NMKL No 71:1999		N, FIN			
ISO 17025		I			

Note: In this table priority is given to sample based approaches; farm based approaches at slaughterhouse may be described in Table SA11.
"()": Numbers in brackets are number of samples taken.
1. In Denmark, ante-mortem negative batches: 4 pools of 10 samples of cuts of meat. Ante-mortem positive batches: 12 pools of 5 samples of cuts of meat.
2. In Finland, crushed meat from cleaning tools, tables etc.; similar approach for ducks, geese and guinea fowl.
3. In Slovenia, monitoring is based on results from previous years. Samples are collected proportional with the human population in the country.
4. Sample size and frequency depend on slaughterhouse capacity.
5. In Denmark, a batch is defined as the meat from animals slaughtered between two cleanings and disinfections of the processing equipment.
6. In Denmark, sampling by local authorities.

Appendix Table SA13. *Salmonella* monitoring programmes in duck breeders, 2004

Day old chicks		Rearing period			Production period		
Sampling scheme following the provisions of Directive 92/117/EEC							
Dead chickens	LV, S, N, PL,SK	4 and 2 weeks before moving	Faecal samples	LV, N (60), PL (60), SK (60), S (60)	Every 2 weeks	Dead chickens (50)	PL, SK
Samples from the internal linings of the delivery boxes	LV, S, N, PL,SK	4 and 2 weeks before moving	Caecal samples (10)	S	Every 2 weeks	Meconium samples at the hatchery (250) or dead chick-ens (10-50)	N
Meconium	S (250)				Every 2 weeks	Faecal samples	LV[4]
Each flock is sampled six times a year in accordance with plan approved by Decision 96/389/EC	IRL		Each flock is sampled six times a year in accordance with plan approved by Decision 96/389/EC	IRL	Once a month	Faecal samples	S (60)
					Official sampling every 8 weeks	Meconium samples at the hatchery (250)	LV[3], S, PL, SK
Other schemes							
Internal lining papers of delivery boxes (5)	F	At 2, 10 weeks and 2 weeks before moving	On farm: Faecal and litter samples (10), dust swab[2] (1)	F	Every 2 month	On farm: Faecal and litter samples (10), dust swab[2] (1)	F
Swabs/faeces	CZ[1]		Swabs/faeces	CZ[1]		In hatchery: Environmental swab[5] (1)	F
						Swabs/faeces	CZ[1]

Diagnostic methods used

ISO 6579:2002	CZ, LV, PL
NMKL No 71:1999	N, S

Countries not providing detailed information about monitoring programmes

No information available	A, CY, FIN, F, D, GR, H, IRL, LT, L, M, NL, P, SLO, ES
No official surveillance programme	B, CZ, DK, I, UK
No duck breeder flocks present	EST

"()": Number in brackets represent number of samples.
1. In Czech Rep., only clinically ill or suspected animals are sampled.
2. In France, 1 gauze swab (the sampling method consists in wiping 5 different sites of the poultry house).
3. In Latvia, breeding flocks whose eggs are hatched at a hatchery with a total incubator capacity of 1000 eggs or more.
4. In Latvia, breeding flocks whose eggs are hatched at a hatchery with a total incubator capacity of less than 1000 eggs.
5. In France, 1 gauze swab (the sampling method consists in wiping the wall of the hatching cabinets or the lining pads of 5 different hatching trays).

Appendix Table SA14. *Salmonella* monitoring programmes in geese breeders, 2004

Day old chicks		Rearing period			Production period		
Sampling scheme following the provisions of Directive 92/117/EEC							
Dead chickens	LV, S, N, PL, SK	4 and 2 weeks before moving	Faecal samples	LV, N (60), PL (60), SK(60), S (60)	Every 2 weeks	Dead chickens (50)	PL, SK
Samples from the internal linings of the delivery boxes	LV, S, N, PL, SK	4 and 2 weeks before moving	Caecal samples (10)	S	Every 2 weeks	Meconium samples at the hatchery (250) or dead chickens (10-50)	N
Meconium	S (250)				Every 2 weeks	Faecal samples	LV[4]
					Once a month	Faecal samples	S (60)
					Official sampling every 8 weeks	Meconium samples at the hatchery (250)	LV[3], PL, SK
Other schemes							
Internal lining papers of delivery boxes (5)	F	At 2, 10 weeks and 2 weeks before moving	On farm: Faecal and litter samples (10), dust swab[2] (1)	F	Every 2 month	On farm: Faecal and litter samples (10), dust swab[2] (1)	F
Swabs/faeces	CZ[1]		Swabs/faeces	CZ[1]		In hatchery: Environmental swab[5] (1)	F
						Swabs/faeces	CZ[1]

Diagnostic methods used	
ISO 6579:2002	CZ, LV, PL
NMKL No 71:1999	N, S

Countries not providing detailed information about monitoring programmes	
No information available	A, CY, FIN, D, GR, H, IRL, LT, L, M, NL, P, SLO, ES
No official surveillance programme	B, CZ, DK, I, UK
No geese breeder flocks present	EST

"()": Number in brackets represents number of samples.
1. In Czech Rep., only clinically ill or suspected animals are sampled.
2. In France, 1 gauze swab (the sampling method consists in wiping 5 different sites of the poultry house).
3. In Latvia, breeding flocks whose eggs are hatched at a hatchery with a total incubator capacity of 1000 eggs or more.
4. In Latvia, breeding flocks whose eggs are hatched at a hatchery with a total incubator capacity of less than 1000 eggs.
5. In France, 1 gauze swab (the sampling method consists in wiping the wall of the hatching cabinets or the lining pads of 5 different hatching trays).

Appendix Table SA15. *Salmonella* monitoring programmes in ducks and geese – production level, 2004

Day old chicks		Rearing period and before slaughter (related to the flock)		At slaughter (related to the flock)	
Type of sample					
Faecal/swabs	CZ[1]	Faecal samples (60)	N, S	Carcass samples	IRL
Sampling based on the directive	PL	Faecal/swabs	CZ[1]	Faecal/swabs	CZ[1]
		Sock swabs	DK (5)[2]	Sampling based on the directive	PL
		Sampling based on the directive	PL	Neck skin samples	A[3], N, S
		Cloacal swabs	A	Carcasses (1 flock per cycle=205 per annum)	IRL
Frequency of sampling					
		2-3 weeks before slaughter	DK		
		1-2 weeks before slaughter	S, PL		
		1-3 weeks before slaughter	N		
		max. 3 weeks before slaughter	A		
Diagnostic methods used					
ISO 6579:2002		CZ, LV, PL			
NMKL No 71:1999		N, S			
Countries not providing detailed information about monitoring programmes					
No information available		A, CY, FIN, F, D, GR, H, LT, L, M, NL, P, SK, SLO, ES			
No official surveillance programme		B, CZ, DK, I, UK			
No duck and geese production flocks present		EST			

"()": Numbers in brackets represent number of samples.
1. In Czech Rep., only clinically ill or suspected animals are sampled.
2. In Denmark, samples are mainly in the duck production, as production of geese is limited.
3. In Austria, flocks with positive findings in cloacal swabs (and if the carcasses is not subject to heat-treatment).

Appendix Table SA16. *Salmonella* monitoring programmes in pigs, 2004

Breeding and multiplying herds		Fattening herds – at farm		Fattening herds – at slaughter	
Type of sample					
Blood samples	DK(10),	Faecal samples	A, EST[6], NL, S	Carcass swabs	B, DK, N[6,8], S[6]
Pen faecal samples	DK[3]	Faecal samples or swabs	CZ[1]	Lymph nodes	FIN[7], N[6,8], S[6]
Faecal samples or swabs	CZ[1]	Pen faecal samples	DK[2,6], FIN	Meat juice	DK[4], UK[10]
Faecal samples	EST[6], FIN[5], N, S	Carcass/rectal swabs/ litter/feed	SLO1	Pen faecal samples	DK[2, 6]
Carcass/rectal swabs/ litter/feed	SLO[1]			Faecal samples or swabs	CZ[1]
Frequency of sampling					
Monthly	DK	Clinical suspicion	N, S	Random samples	N, FIN[7], S
Once a year – all herds	FIN (3000), N	Random samples	NL	Continuous	B, DK, FIN, N, S
Once a year – all elite breeding herds. Twice a year – all sow pools	S				
Diagnostic methods					
Modified ISO 6579 (2002)		A			
ISO 6579 (2002)		CZ, EST, FIN, GR, NL, SK			
Mix ELISA		DK, UK			
Bacteriology		DK, SLO			
NMKL No 71:1999		FIN, N, S			
Strategies in countries with no official sampling stratetegies, 2004					
No official monitoring		B, CY, CZ, GR, I[9], PL, SK, UK			
Clinically ill or suspected animals are sampled		PL, SK, SLO, UK			

Note: Monitoring is not compulsory by Directive 92/117/EEC.
In this table priority is given to farm based approaches; sample based approaches at slaughterhouse may be described in Table SA18.
"()": Numbers in brackets are number of samples taken.
1. Only clinically ill or suspected animals are sampled.
2. In Denmark, level 2 (herds with a higher proportion of reactors) and level 3 (herds with an unacceptable high proportion of reactors) herds, max. two samples per year.
3. In Denmark, if the herd reaches *Salmonella*-index 5 or above, max. two samples per year.
4. In Denmark, all herds producing more than 200 pigs for slaughter per year are monitored.
5. In Finland, all pigs sent to semen collection centres have to be examined for *Salmonella* with negative results.
6. Number of samples depend on herd size.
7. In Finland, 3000 samples from fattening pigs and 3000 samples from sows annually, stratified sampling procedure.
8. In Norway, sows from multiplying herds are sampled in the same way as slaughter pigs at slaughter.
9. In Italy, a monitoring programme is running in the Veneto Region.
10. In UK, sampling is voluntary.

Appendix Table SA17. Measures taken in pig herds in case of *Salmonella* infections or *Salmonella* findings, 2004

Serovars covered	
All Serovars	A[7], DK, EST, FIN, S, N, UK
Only *S.* Enteritidis, *S.* Typhimurium	CZ, N-IRL
Restrictions on the farm	
Animal movement prohibited	FIN, S, N
Isolation of *Salmonella* positive animals	EST, FIN, N
Person contacts restricted	EST, S, N
Advise to the farm for controlling the infection	FIN, S, N, SLO, UK
Consequence for slaughter animals	
Slaughterhouse is informed on positive animals	EST, N, S
Sanitary slaughter	DK (level 3 herds)[3], EST, FIN, N[4], S[4]
Contaminated food withdrawn from market	N, S[6]
Treatment with antibiotics	EST
Other consequences	
Feedingstuffs are restricted (heat treatment or destruction)	S, SLO
Treatment of manure/sludge	EST, DK (level 3 herds), SLO, S, N
Public health advice	N-IRL
Cleaning and disinfection obligatory	EST, FIN, N, SLO, S
Repeated negative testing necessary before lifting the restrictions[1]	EST, FIN, S, N
Reduction in payment for positive slaughter pigs	DK
Further investigations	
Epidemiological investigation is always started	B, DK (level 2+3), EST, FIN, N, SLO, S
Feed suppliers are always included in the investigation	EST, N, S
Contact herds are included in the investigation	N, S
Vaccination	
Permitted	CZ, UK
No vaccination occurs	A, B[2], DK[2], S
Prohibited	EST, FIN, N

Note: No measures fixed in Directive 92/117/EEC.
1. Typically, two consecutive samplings one month apart.
2. No vaccine has been approved.
3. In Denmark, hot water treatment of all carcasses from MRDT 104 positive herds with a *Salmonella* index above 20.
4. In Norway and Sweden, autopsy is collected from all sanitary slaughtered animals.
5. In Estonia, *S.* Enteritidis, *S.* Typhimurium, *S.* Dublin, *S.* Newport and *S.* Cholerasuis are notifiable.
6. In Sweden, carcasses contaminated with *Salmonella* are unfit for human consumption.
7. In Austria, the carcasses contaminated with *Salmonella* are unfit for human consumption and must be removed. In all slaughtered animals descending from the same holding a post-mortem bacteriological examination has to be initiated.

Appendix Table SA18. *Salmonella* monitoring programmes in pigs and pig meat, 2004

Slaughterhouse and cutting plant		Processing plants		Pork and pork products at retail	
Type of sample					
Surface swabs	B[6] (100-300/ matrix), CZ, DK[2], EST[1], FIN[2], N (3000 year)[2], S[2]	Crushed meat samples	N[7, 8]	Regional programmes	UK-GB
Lymphnodes	N (3000/ year), S[2]	Depend on survey or own-control plans	DK[3], S[3]	Depend on survey or own-control plans	DK[3], S[3]
Caecal samples	UK-GB			Minced meat	B[6] (100-300/matrix)
Cutting and minced meat samples	B[6] (100-300/ matrix)	Fresh meat	N[4]	Final product	CZ, D
Crushed meat samples[7]	FIN[2], N (cutting plant)[2], S (cutting plant)[2]	Final product	CZ, IRL (twice per year)	Fresh meat, final products	EST, LV
Environmental samples	EST	Fresh meat, minced meat, final products	EST	Environmental samples	EST
Fresh meat	EST[2], H, SLO	Environmental samples	EST	Fresh meat	NL, SLO (100/ year)[8]
		Surface swabs	H		
HACCP	A, CZ, I, SLO	HACCP	A, CZ, I, SLO	HACCP	A, CZ, I, SLO
Frequency					
Weekly	B	Continuous	LV	May-August	SLO
Every 2 weeks	CZ	Random and continuous	CZ, EST, H[5]	Continuous	LV
Random and continuous	EST, FIN, H[5], N, S	20% of consignments from EEA, all consignments from third country	N[4]	Weekly	B
Continuous	DK[2]	Surveys or own-control	DK[3], S[3]	Random and continuous	CZ, EST
1 sample per 2000 animal slaughtered	SLO			Monitoring	D, IRL
Random sample evenly distributed over the working day, week and quarter of the year – survey in 2003	UK (GB)	Sampling according to the Council Directive 95/65/EC	N	Survey or own-control	DK[3], S[3]
				Yearly monitoring	NL

Note: Monitoring is not compulsory by Directive 92/117/EEC.
In this table priority is given to sample based approaches; farm based approaches at slaughterhouse may be described in Table SA16.
"()": Numbers in brackets are number of samples taken.
1. Sample frequency depend on annual number of pigs slaughtered.
2. Sample size and frequency depend on slaughterhouse capacity.
3. Sampling by local authorities.
4. In Norway, imported meat.
5. In Hungary, sampling strategy is based on the previous years production.
6. In Belgium, a monitoring programme based on matrixes of carcasses, cuts and minced meat of pork was carried out in 2004.
7. Samples collected from cutting equipment, cleaning tools, tables etc.
8. In Slovenia, monitoring is based on results from previous years. Samples are collected proportional with the human population in the country.

Appendix Table SA18. *Salmonella* monitoring programmes in pigs and pig meat, 2004 (cntd.)

Slaughterhouse and cutting plant	Processing plants	Pork and pork products at retail	
Diagnostic methods			
Modified ISO 6579:1999	A, D, I		CY
ISO 17025	B, I		
Belgian official method SP-VG-M002	B		
ISO 6579:2002	CZ, EST, FIN, H, I, LV, SLO, S		
Depend on the laboratory and/or survey	DK		
NMKL No 71:1999	FIN, N, S		
Any approved method according to Comm. Decision 2003/470	S		

Note: Monitoring is not compulsory by Directive 92/117/EEC.
In this table priority is given to sample based approaches; farm based approaches at slaughterhouse may be described in Table SA16.

Appendix Table SA19. *Salmonella* monitoring programmes in cattle, 2004

Breeding herds		Cattle – at farm		Cattle – at slaughter	
Type of sample					
Faecal samples	FIN[5]	Faecal samples	DK[3], EST[4], FIN, D[1], NL, N[1], UK-GB[7]	Lymph nodes	FIN (3000/ year), S, N (3000/ year)[4]
		Faecal samples or swabs	CZ[1]	Carcass swabs	B, DK, N (3000/ year)[4], S4
		Bulk milk	DK[2]	Blood	DK
		Carcass/rectal swabs/ littre/feed	SLO[1]	Faecal samples and organ samples	D[1]
		Organ samples	EST, UK-GB[7]	Faecal samples or swabs	CZ[1]
Frequency of sampling					
Once a year – all herds	FIN (3000)	Every three months	DK	Random samples	FIN, N, S
		Once a year	NL	Once every 21 days-5 months	DK
		Clinical suspecion	S	Continuous	S
Diagnostic methods used trough the production					
Modified ISO 6579 (2002)		A, F, S			
ISO 6579 (2002)		CZ, EST, FIN, GR, SK			
Mix-ELISA		DK			
Bacteriology		DK, SLO, UK-GB			
NMKL No 71:1999		FIN, N, S			
Strategies in countries with no official sampling strategies, 2004					
No official monitoring		B, CY, CZ, GR, I[6], PL, SK, UK			
Clinically ill or suspected animals are sampled		PL, SK, UK			

Note: Monitoring is not compulsory by Directive 92/117/EEC.
In this table priority is given to farm based approaches; sample based approaches at slaughterhouse may be described in Table SA21.

1. Only clinically ill or suspected animals are sampled.
2. In Denmark, serological testing; control programme for *S.* Dublin in dairy herds.
3. In Denmark, when requested by the farmer.
4. Number of samples depend on herd size.
5. In Finland, all animals sent to semen collection centres have to be examined for *Salmonella* with negative results.
6. In Italy, a monitoring programme is running in the Veneto Region.
7. In UK-GB, sampling is voluntary.

Appendix Table SA20. Measures which may be taken in cattle herds in case of *Salmonella* infections or *Salmonella* findings, 2004

Serovars covered	
All Serovars	A[6],DK, EST, FIN, N, S, UK
Only *S.* Enteritidis, *S.* Typhimurium	CZ
Restrictions on the farm	
Animal movement prohibited	FIN, DK (MR S. Typhimurium DT 104), S, N
Isolation of *Salmonella* positive animals	EST, FIN, N, S
Person contacts restricted	EST, N, S
Restriction on marketing of milk	N, S
Pasteurisation of milk obligatory	EST, N, S
Advise to the farm for controlling the infection	DK, FIN, N, SLO, S, UK-GB
Consequence for slaughter animals	
Slaughterhouse is informed on positive animals	EST, FIN, N, S
Sanitary slaughter	EST, DK, FIN, N, S[4]
Contaminated food withdrawn from the market	S[3]
Destruction of positive animals	D
Treatment with antibiotics	EST
Other consequences	
Feedingstuffs are restricted (heat treatment or destruction)	SLO, S
Treatment of manure/sludge	EST, DK, N, SLO, S
Cleaning and disinfection obligatory	EST, FIN, N, S
Repeated negative testing necessary before lifting the restrictions[2]	EST, DK, FIN, N, S
Public health advise	UK-NI
Further investigations	
Epidemiological investigation is always started	DK (MR *S.* Typhimurium DT 104), EST, FIN, N, SLO, S, UK-NI5
Feed suppliers are always included in the investigation	EST, S, N
Contact herds are included in the investigation	DK (MR *S.* Typhimurium DT 104), N, S
Vaccination	
Permitted	CZ, D, UK-GB (*S.* Dublin)
No vaccination occurs	A, B[1], DK[1], S
Prohibited	EST, FIN, N

Note: No measures fixed in Directive 92/117/EEC.
1. No vaccine has been approved.
2. Typically, two consecutive samplings one month apart.
3. In Sweden, carcasses contaminated with *Salmonella* are unfit for human consumption.
4. In Sweden, autopsys is collected from all sanitary slaughtered animals.
5. In UK-NI, when *S.* Enteritidis, *S.* Typhimurium is isolated, or any serotype is isolated in milk.
6. In Austria, the carcasses contaminated with Salmonella are unfit for human consumption and must be removed. In all slaughtered animals descending from the same holding a post-mortem bacteriological examination has to be initiated.

Appendix Table SA21. *Salmonella* monitoring programmes in cattle and bovine meat, 2004

Slaughterhouse and cutting plant		Processing plants		Beef at retail	
Type of sample					
Surface swabs	B[6] (100-300/ matrix), CZ, DK[2], EST[1], FIN[2], N (3000/ year)[2], S2	Depend on survey or own-control plans	DK[7], S[7]	Depend on survey or own-control plans	DK[7], S[7]
Lymph nodes	N (3000/ year)[2], S2	Crushed meat samples	N[3,4]	Minced beef	B[6] (100-300/ matrix)
Fresh meat	EST[2], H	Fresh meat, minced meat, final products	EST	Fresh meat, final products	EST, H
Crushed meat samples[3]	FIN[2], N[2], S[2]	Scrapings	S	Fresh meat	NL
Faeces from rectum	GB	Fresh meat	N[5]	Final product	CZ, D
Minced beef	B[6] (100-300/ matrix)	Final product	CZ, H	Regional programmes	UK
HACCP	A, CZ, H, I	HACCP	A, CZ, H, I	HACCP	A, CZ, I
Frequency					
Daily, weekly, monthly or twice annually	S	20% of consignments from EEA, all consignments from third country	N[5]	Weekly	B
Weekly	B	Random and continuous	CZ, EST, H	Random and continuous	CZ, EST, H
Every 2 weeks	CZ	Surveys or own-control	DK[7], S[7]	Monitoring	D, IRL[7]
Random and continuous	EST, FIN, N			Surveys or own-control	DK[7], S[7]
Continuous	DK[2]				

Diagnostic methods	
Modified ISO 6579:1999	A, D, I
ISO 17025	B, I
Belgian official method SP-VG-M002	B
ISO 6579:2002	CZ, EST, FIN, H, I, S
Depend on the laboratory and/or survey	DK
NMKL No 71:1999	FIN, N

Note: Monitoring is not compulsory by Directive 92/117/EEC.
In this table priority is given to sample based approaches; farm based approaches at slaughterhouse may be described in Table SA19.
"()": Numbers in brackets are number of samples taken.
1. Sample frequency depend on annual number of cattle slaughtered.
2. Sample size and frequency depend on slaughterhouse and cuttingplant capacity.
3. Samples collected from cutting equipment, cleaning tools, tables etc.
4. In Norway, sampling according to the Council Directive 95/65/EC.
5. In Norway, imported meat.
6. In Belgium, a monitoring programme based on matrixes of carcasses, cuts and minced meat of beef was carried out in 2004.
7. Sampling by local authorities.

Appendix Table SA22. Countries providing data on serovars and phagetypes of *S.* Enteritidis and *S.* Typhimurium

	Humans		Cattle		Pigs		*Gallus gallus*	
Country	Serovars	Phage-typing[1]	Serovars	Phage-typing	Serovars	Phage-typing	Serovars	Phage-typing
Austria	x	x	x	x	x	x	x	x
Belgium	x	x	x		x		x	
Cyprus	x		No data on animals					
Czech republic	x		x	x	x	x	x	x
Denmark	x	x	x	x	x	x	x	x
Estonia	x		x		x		x	
Finland	x	x	x	x	x	x	x	x
France	o						x	
Germany	o		x	x	x	x	x	x
Greece	x		x				x	
Hungary	x	x	x		x		x	x
Ireland	x	x						
Italy	o		x	x	x	x	x	x
Latvia	x		No data on animals					
Lithuania	x		x		x		x	
Luxembourg	No data available							
Malta	x		No data on animals					
The Netherlands	x	x	x	x	x	x	x	x
Norway[2]	x		No data on animals					
Poland	o		x		x		x	
Portugal	o							
Slovakia	o		x	x	x	x	x	x
Slovenia	x						x	
Spain	x						x	
Sweden	x		x		x		x	
United Kingdom	x		x	x	x	x	x	x

x: complete serotype/phagetype distribution.
o: typing only specified to *S.* Enteritidis, *S.* Typhimurium, *Salmonella* other.
1. Phagetyping: *S.* Enteritidis and/or *S.* Typhimurium phagetyping.
2. In Norway, *S.* Enteritidis was not found in animals. The *S.* Typhimurium found were, with few exceptions, not phagetyped.

Appendix Table SA22. Countries providing data on serovars and phagetypes of *S.* Enteritidis and *S.* Typhimurium (cntd.)

	Other poultry		Beef		Pork		Broiler meat		Other poultry meat	
Country	Serovars	Phage-typing	Serovars	Phage-typing	Serovars	Phage-typing	Serovars	Phage-typing	Serovars	Phage-typing
Austria	x	x	x		x		x	x	x	x
Belgium					x		x			
Cyprus										
Czech republic	x	x	x					x		x
Denmark	x		x	x	x	x	x		x	
Estonia	x		x		x		x		x	
Finland	x	x	x	x			x			
France										
Germany	x	x	x		x		x	x		x
Greece	x						x			
Hungary	x		x	x	x	x	x	x	x	x
Ireland			x	x	x	x	x	x	x	x
Italy	x	x	x	x	x	x	x	x	x	x
Latvia										
Lithuania	x		x		x		x			
Luxembourg										
Malta										
The Netherlands	x	x								
Norway[2]										
Poland	x									
Portugal										
Slovakia	x				x		x	x		
Slovenia	x						x		x	
Spain										
Sweden										
United Kingdom	x	x					x			

x: complete serotype/phagetype distribution.
o: typing only specified to *S.* Enteritidis, *S.* Typhimurium, *Salmonella* other.
1. Phagetyping: *S.* Enteritidis and/or *S.* Typhimurium phagetyping.
2. In Norway, *S.* Enteritidis was not found in animals. The *S.* Typhimurium found were, with few exceptions, not phagetyped.

Appendix Table SA23. Notification on *Salmonella* in humans, *Gallus gallus*, other animals and food, 2004

	Notifiable in humans since	Notifiable in *Gallus gallus* since	Notifiable in other animals since	Notifiable in food since
Austria	1947[1, 2]	1998[3]	1994[4]	1975
Belgium	<1999	1998	1998	2004
Cyprus	yes	yes	yes	-
Czech Republic	yes	yes	yes	-
Denmark	1979	no	1993[4]	-
Estonia	1958	2000[9]	2000[9]	2000
Finland	1995	1970's	1970's	1970's
France	no	yes[10]	-	-
Germany	yes	-	yes	-
Greece	yes	1992	1980	-
Hungary	1959	no	no	1984
Ireland	1948	-	-	yes[8]
Italy	1990	1954	1954	1962
Latvia	1958	yes	yes	2002
Lithuania	1962	yes	yes	-
Luxembourg	-	-	-	-
Malta	-	-	-	-
Norway	1975	1965	1965	1995[6]
Poland	-	1999[11]	-	-
Portugal	yes	yes	yes	-
Slovakia	yes	2004	yes[4]	2000
Slovenia	1949	1991[7]	1991[7]	2003
Spain	1982[5]	1994	1994	1994
Sweden	1968	1961	1961	1961
The Netherlands	no	yes	yes	-
United Kingdom	-	1989	1989	no

1. In Austria, notifiable since 14 April 1913, re-proclaimed 12 June 1947, adapted on 28 April 1950.
2. In Austria, clinical cases notifiable since 1996.
3. In Austria, detection of *S.* Enteritidis, *S.* Typhimurium, *S.* Pullorum and *S.* Gallinarum notifiable in breeding animals.
4. Clinical cases notifiable.
5. In Spain, only hospitalised cases are notifiable.
6. In Norway, only those detected in the national control programme.
7. In Slovenia, the year of independence, however this disease was notifiable before 1991.
8. In Ireland, detection of *S.* Enteritidis and *S.* Typhimurium is notifiable.
9. In Estonia, *S.* Enteritidis, *S.* Typhimurium, *S.* Dublin, *S.* Newport and *S.* Cholerasuis are notifiable.
10. In France, in breeding flocks and laying hens, *S.* Enteritidis and *S.* Typhimurium, only.
11. In Poland, *S.* Enteritidis, *S.* Typhimurium, *S.* Pullorum and *S.* Gallinarum are notifiable in poultry.

Appendix Table TB1. Notification of tuberculosis in humans, *Gallus gallus*, other animals and food, 2004

	Notifiable in humans since	Notifiable in *Gallus gallus* since	Notifiable in other animals since	Notifiable in food since
Austria	1947/2004[7]	-	1909/1999[7]	-
Belgium	<1999	1998	1963	2004
Cyprus	-	-	-	-
Czech Republic	yes	yes	yes	-
Denmark	1905	1993	1920[6]	-
Estonia	1950	1962	1962	no
Finland	1995[1]	1995[1]	1902	1902
France	yes	-	-	-
Germany	yes	yes	yes	-
Greece	yes	-	1936 (bovine)	-
Hungary	1946	no	yes (bovine)	no
Ireland	1948	-	-	-
Italy	1990	-	1954	1928
Latvia	yes	yes	yes	-
Lithuania	1990	yes	yes	-
Luxembourg	-	-	-	-
Malta	-	-	-	-
Norway	1900	1965	1894	1894[2]
Poland	-	-	-	-
Portugal	yes	yes	yes	-
Slovakia	yes	no	yes	-
Slovenia	1949	-	1991[3]	2003
Spain	1948[8]	-	1952	1952
Sweden	>30 years ago	yes	yes	-
The Netherlands	yes	no	1999	-
United Kingdom	yes	-	>1984[4]	-

1. In Finland, notifiable also before 1995, but legislation changed in 1995.
2. In Norway, mandatory meat inspection at slaughterhouse.
3. In Slovenia, the year of independence. The disease was notifiable before 1991.
4. In the United Kingdom, the first TB Orders were passed in 1913 and 1925 to remove clinically ill cattle. In deer, TB has been notifiable since 1st June 1989. From 2005, TB will become notifiable in all mammals except man.
6. In Denmark, only clinical cases are notifiable.
7. In Austria, *M. bovis* notifiable since 2004 in humans and since 1999 in animals, *M. tuberculosis* notifiable since 1947 in humans and since 1909 in animals.
8. In Spain, only hospitalised cases are notifiable.

Appendix Table TB-BR1. Status as Officially free of bovine brucellosis (OBF), officially free of *B. melitensis* in sheep and goats (ObmF) and officially free of bovine tuberculosis (OTF)

	Bovine brucellosis		*Brucella melitensis*		Bovine tuber-culosis
	OBF[1] since	**Comments**	**ObmF[2] since**	**Comments**	**OTF[3] since**
Austria	1999	-	2001	-	1999
Belgium	2003	-	2001	-	2003
Cyprus	no	Never detected in domestic animals, imported cases in 1921 and 1932	no	Eradication programme	-
Czech Republic	2004	Eradication programme terminated in 1964	2004	Never detected	2004
Denmark	1980	No cases since 1962	1979	Never detected	1980
Estonia	no	No cases since 1961, Surveillance according to EC legislation in 2004	no	No cases since 1962, surveillance of breeding herds	no
Finland	1994	No cases since 1960	1994	Never detected	1994
France	no	-	2001 (64 departements)	-	yes
Germany	2000	-	2000	-	1997
Greece	no	Eradication programme. Thessaloniki area is eradication and vaccination area for Bovine brucellosis, only	no	Eradication programme on Islands, vaccination on the mainland	-
Hungary	no	Declared free by OIE in 1985	2004	Never detected	no
Ireland	no	-	yes	Never detected	-
Italy	yes (22 provinces)	Vaccination in two areas (Monti Nebrodi in Sicily and Caserta in Campania)	yes (20 provinces)	Vaccination in Sicily	yes (6 provinces)
Latvia	no	No cases since 1963	no	Never detected	-
Lithuania	no	Yes, according to OIE demands	no	Yes, according to OIE demands	no
Luxemburg	1999	No cases since 1999	yes	-	1996
Malta	no	No cases since 1996	no	No cases since 1996	-
Norway	1994	No cases since 1953	1994	Never detected	1994
Poland	no	-	no	Surveillance of breeding herds, *B. Melitensis* never detected	-
Portugal	2002 (Azores)	Eradication programme, vaccination only in exceptional situations	2002 (Azores)	Eradication programmes, regional vaccination	-
Slovakia	no	OBF in 2005	2004	-	no
Slovenia	no	Yes, according to OIE demands. No cases since 1961	no	ObmF in 2005	no
Spain	no	Eradication programmes, vaccination in high risk areas	2001 (Canaries)	Eradication programmes, vaccination in high risk areas	-
Sweden	1995	No cases since 1957	1994	-	1995
The Netherlands	1996	-	1993	Never detected	yes
United Kingdom	1985 (GB)	-	1991	Never detected	no

1. OBF according to Council Directive 64/432/EEC as amended by Council Directive 97/12/EC and Commision Decisions 93/52/EEC, 2003/467/EC and 2004/320/EC.
2. ObmF according to Council Directive 91/68/EEC and Commision Decisions 93/52/EEC, 94/877/EEC, 2003/467/EC and 2004/320/EC.
3. OTF according to Council Directive 64/432/EEC as amended by Council Directive 97/12/EC and regulation (EC) 1226/2002, and Commission Decision 2003/467/EEC.

Appendix Table TO1. Monitoring and diagnostics for Toxoplasmosis in humans and animals, 2004

Country	Humans		Animals
	Type of cases reported	Monitoring	Monitoring
Austria	-	Serological screening of pregnant women	-
Belgium	-	-	-
Cyprus	EU-recommended (clinical+lab)	-	-
Czech Republic	EU-recommended (clinical+lab)	-	-
Denmark	Only congenital reported	Since 1999 nationwide neonatal screening	-
Estonia	EU-recommended (clinical+lab)	No monitoring	-
Finland	Lab-confirmed clinical cases	-	-
France	-	-	-
Germany	Only congenital cases reported	-	-
Greece	Only congenital cases reported	-	Animals data from routine diagnostics
Hungary	Lab-confirmed	-	-
Ireland	EU-recommended (clinical+lab)	-	-
Italy	-	-	Data from local and general control programme and research
Latvia	Lab confirmed clinical cases	-	Animals data from routine diagnostics
Lithuania	Lab confirmed clinical cases and congenital cases	-	-
Luxembourg	-	-	-
Malta	-	-	-
Norway	Lab-confirmed Encephalitic cases since 1975. Other notification stopped 1995	-	-
Poland	Lab confirmed clinical cases	No monitoring	No monitoring in animals
Portugal	-	-	-
Slovakia	-	No monitoring	-
Slovenia	EU-recommended (clinical+lab)	Routine serological screening of pregnant women	-
Spain	-	Surveillance according to Directive 2003/99/EC	-
Sweden	Notification stopped July 2004	-	-
The Netherlands	-	No monitoring	-
United Kingdom	Lab confirmed clinical cases	Voluntary lab reporting except from Scotland (notification)	Vaccine available for sheep

Appendix Table TO2. Notification and monitoring of *Toxoplasma* in humans, animals and food, 2004

	Notifiable in humans since	Notifiable in animals since	Notifiable in food since
Austria	no	no	no
Belgium	<1999[1]	1998	2004
Cyprus	no (from 2005)	-	-
Czech Republic	yes	no	-
Denmark	no	no	-
Estonia	1997	no	2000
Finland	1995	1995[2]	no[3]
France	no	-	-
Germany	yes (congenital cases)	yes	-
Greece	yes (congenital cases)	-	-
Hungary	1967	no	-
Ireland	2004	-	-
Italy	1990	no	-
Latvia	1996	yes	-
Lithuania	yes (congenital cases since 1999)	>30 years	-
Luxembourg	-	-	-
Malta	-	-	-
Norway	no[4]	1965	no
Poland	-	-	-
Portugal	-	no	-
Slovakia	no	no	no
Slovenia	1977	1991[5]	2003
Spain	1982[6]	1994	1994
Sweden	no	no	no
The Netherlands	no	yes	yes
United Kingdom	1990 (Scotland)	no	no

1. In Belgium, the French Community.
2. In Finland, also notifiable before 1995, but legislation changed in 1995.
3. In Finland, food business operator has to notify to the competent authority, but there is no central notification system.
4. In Norway, encephalitis cases have been notifiable since 1975.
5. In Slovenia, the year of independence. The disease was notifiable before 1991.
6. In Spain, only hospitalised cases are notifiable.

Appendix Table TR1. Diagnostic methods and monitoring programmes for *Trichinella*, 2004

	Humans	Animals	Animals – monitoring programmes	
	Diagnostic methods	**Diagnostic methods**	**Meat inspection at slaughter**	**Other monitoring**
Austria	Serology (ELISA), Western Blot	Directive 77/96/EEC (digestion or compression method)	Pigs, horses, farmed wild boars	Wild boars: monitoring scheme
Belgium		Directive 77/96/EEC (digestion method)	Pigs for export, horses, wild boar	Other wildlife monitored when relevant
Cyprus	EU recommendations	Directive 77/96/EEC (digestion method)	Pigs (started in 2004, 80% examined)	
Czech Republic	-	Directive 77/96/EEC (digestion or compression method)	Pigs, horses, wild boars	Other wildlife monitored when relevant
Denmark	Serology, histopathology	Directive 77/96/EEC (digestion method)	Pigs and horses slaughtered at export approved slaughter houses, all wild boars	
Estonia	Clinical symptoms, eosinophilia	Digestion or compression method	Pigs, horses, wild boars	Other wildlife monitored when relevant
Finland	Serology, histopathology	Directive 77/96/EEC (digestion or compression method)	Pigs, horses, wild boars	
France	Immunofluorescence	Digestion method	Pigs, horses	Wild boars: sampling are carried out as a survey
Germany	Serology (ELISA), histopathology	Directive 77/96/EEC (digestion method) and PCR	Pigs, horses, wild boars	Other wildlife monitored when relevant
Greece	-	Directive 77/96/EEC (digestion or compression method)	Pigs	
Hungary	Serology (ELISA), histopathology, Western Blot	Directive 77/96/EEC (digestion method)	Pigs, horses, wild boars	Other wildlife monitored when relevant
Ireland	-	-	-	-
Italy	-	Directive 77/96/EEC (digestion method)	Pigs	
Latvia	Serology (ELISA)	Directive 77/96/EEC (digestion or compression method)	Pigs, horses, wild boars	Home slaughtering: The owner is responsible for ensuring control
Lithuania	Serology, (ELISA)	-	-	-
Luxembourg	-	Directive 77/96/EEC (digestion or compression method)	Wild boar	Pigs and horses: risk assessment scheme
Malta	-	Compression method	Horses	Pigs: random on the slaughter line
The Netherlands	-	Directive 77/96/EEC (digestion method)	Pigs, horses	

Appendix Table TR1. Diagnostic methods and monitoring programmes for *Trichinella*, 2004 (cntd.)

	Humans	Animals	Animals – monitoring programmes	
	Diagnostic methods	**Diagnostic methods**	**Meat inspection at slaughter**	**Other monitoring**
Norway	Serology and histopathology	Directive 77/96/EEC (digestion or compression method)	Pigs, horses, wild boars, badgers, bears	Foxes: occasionally
Poland	Serology and histopathology	Directive 77/96/EEC (digestion or compression method)	Pigs, horses, wild boars	
Portugal	-	digestion or compression method		Some pigs at meat inspection
Slovakia	-	Directive 77/96/EEC (digestion or compression method)	Pigs, horses, wild boars	Other wildlife monitored when relevant
Slovenia	-	Directive 77/96/EEC (digestion or compression method)	Pigs, horses, wild boars	Other wildlife monitored when relevant
Spain	-	Directive 77/96/EEC (digestion or compression method)	Pigs, hunted wildlife	
Sweden	Serology (ELISA/IFL)	Directive 77/96/EEC (digestion method)	Pigs, horses, wild boars, bears	Other wildlife monitored when relevant
United Kingdom	-	Directive 77/96/EEC (digestion method)	Pigs, horses	

Appendix Table TR2. Notification of *Trichinella* in humans, animals and food, 2004

	Notifiable in humans since	Notifiable in animals since		Notifiable in food since	Follow the directives[3]
Austria	1947	1994	Pigs, horses, wild boars,	1994	yes
Belgium	<1999[1]	1998	-	2004	yes
Cyprus	no (2005)	yes	Pigs	-	yes
Czech Republic	yes	yes	Pigs, horses, wild boars, other wildlife	-	yes
Denmark	no	1920[2]	Pigs, horses, wild boars	-	yes
Estonia	1945	2000	Pig, horses, wild boars, other wildlife	2000	yes
Finland	1995	1930	Pigs, horses	1930	yes
France	no	-	-	-	-
Germany	yes	yes	Pig, horses, wild boars, other wildlife	-	yes
Greece	yes	1980	Pigs	1977	yes
Hungary	1960	no	Pigs, horses, nutria, wild boars	1984	yes
Ireland	2004	-	-	-	-
Italy	1990	-	Pigs	1958	yes
Latvia	1988	yes	Pigs, horses	-	yes
Lithuania	1990	>30 years	-	-	yes
Luxembourg	-	-	Pigs, wild boar	-	yes
Malta	-	-	Pigs (random), horses	-	-
Norway	1975	1965	Pigs, horses, wild boars, badger, bears	1965	yes
Poland	2001	1928	Pigs, horses, wild boars	-	yes
Portugal	yes	yes	-	yes	-
Slovakia	yes	yes	All animals for human consumption	2000	yes
Slovenia	1949	1991	Pigs, horses, wild boars, bears	2003	yes
Spain	1948	1952	Pigs, wild boars	1952	yes
Sweden	>30 years	yes	Pigs, horses, wild boars, bears	yes	yes
The Netherlands	yes	yes	Pigs, horses, ruminants	-	yes
United Kingdom	no	1980	Pigs, horses	yes	yes

1. In Belgium, the Flemish Community.
2. In Denmark, only clinical cases are notifiable.
3. Directive 64/433/EEC and/or Directive 77/96/EEC.

Appendix Table VT1. Surveys and monitoring of VTEC in animals and food, 2004

ANIMALS

Country	Agent	Time and place of investigation	Type of sample	Sample size/frequency
Austria	VTEC	Monitoring at slaughterhouse	Faecal sample	350 bovine animals, and 100 sheep and goats sampled evenly over the study period
Belgium	*E. coli* O157	Monitoring at slaughterhouse	Carcass, faecal sample	Trace back to the farm in cases of O157 positive samples
Denmark	*E. coli* O157	Monitoring at slaughterhouse	Faecal samples from calves	One animal (149 examined) per randomly selected herd
Finland	*E. coli* O157	Monitoring at slaughterhouse	Faecal sample	Sampling distributed throughout the year, based on slaughter capacity and herd
Norway	*E. coli* O157	Monitoring at slaughterhouse	Carcass swabs	1 out of 150 slaughtered cattle and goats, 1 out of 1000 slaughtered sheep
Spain	VTEC	Farm in Galicia, otherwise abattoir	Faecal swabs	Different surveys
Sweden	*E. coli* O157[1]	Monitoring at farm	Faecal and/or milk filter sample	Trace back of human VTEC, up to 100 samples per farm, focusing on young stock
	E. coli O157[1]	Monitoring at slaughterhouse	Carcass swabs	Trace back of human VTEC

FOOD

Country	Agent	Time and place of investigation	Type of sample	Sample size/frequency
Austria	VTEC	Food enterprises (restaurants, dairies, retail)		Random sampling according to number of food enterprises per province, each business is sampled at least once per year
Belgium	*E. coli* O157	Monitoring program	Beef carcass swabs	Weekly collection
Czech Republic	VTEC	Official controls, at retail	Meat	28 samples collected randomly
Norway	*E. coli* O157	At slaughterhouse	Carcass swabs	1 out of 150 cattle, 1out of 150 goats and 1 out of 1000 sheep were sampled randomly
Spain	*E. coli* O157	At retail	Red/mixed meat, fruits, vegetables, juice	Samples collected from May-Aug based on population of cities over 10,000 residents
Sweden	VTEC	At slaughterhouse or retail	Beef, cheese, vegetables	Domestic and imported food, testing for serotypes O157, O111, O103, O26

1. In Sweden, O157 or other serotypes that are suspected of being associated with human cases of VTEC infection.

Appendix Table VT2. Notification of VTEC in humans, animals and food, 2004

	Notifiable in humans since	Notifiable in animals since	Notifiable in food since
Austria	1947[1, 2]	no	1975
Belgium	<1999	no (from 2005)	2004
Cyprus	-	-	-
Czech Republic	yes	no	-
Denmark	2000 + HUS (EHEC)	no	-
Estonia	1958 (EHEC)	2000	2000
Finland	1998	2004[3]	no[4]
France	no	-	-
Germany	yes	-	-
Greece	yes (EHEC)	-	-
Hungary	1998	no	-
Ireland	2004 (EHEC)	-	-
Italy	1990	no	1962
Latvia	1999	yes[6]	2004
Lithuania	2004	>30 years	-
Luxembourg	-	-	-
Malta	-	-	-
Norway	1995	no	no
Poland	-	-	-
Portugal	-	-	-
Slovakia	yes	no	2000
Slovenia	1995	1991[5]	2003
Spain	yes[7]	1994	1994
Sweden	2004[8]	yes[9]	no
The Netherlands	yes	no	yes
United Kingdom	no	no	no

1. In Austria, notifiable since 14 April 1913, re-proclaimed 12 June 1947, adapted on 28 April 1950.
2. In Austria, clinical cases notifiable since 1996.
3. In Finland, only notifiable in cattle.
4. In Finland, food business operator has to notify to the competent authority, but there is no central notification system.
5. In Slovenia, the year of independence. The disease was notifiable before 1991.
6. In Latvia, only clinical cases notifiable.
7. In Spain, only hospitalised cases are notifiable.
8. In Sweden, only if suspected associated with human VTEC infection.
9. In Sweden, before only infection with VTEC O157 was notifiable.

Appendix Table YE1. Notification of *Yersinia* in humans, animals and food, 2004

	Notifiable in humans since	Notifiable in animals since	Notifiable in food since
Austria	1947[1, 2]	no	1975
Belgium	<1999[5]	1998	2004
Cyprus	-	-	-
Czech Republic	yes	no	-
Denmark	1979	no	-
Estonia	1982	no	yes
Finland	1995	no	no[3]
France	no	-	-
Germany	yes	-	-
Greece	-	-	-
Hungary	1998	no	-
Ireland	2004	-	-
Italy	1990	no	1962
Latvia	1988	yes[4]	-
Lithuania	1985	>30 years	-
Luxembourg	-	-	-
Malta	-	-	-
Norway	1992	no	no
Poland	-	-	no
Portugal	-	no	-
Slovakia	yes	no	2000
Slovenia	1995	1991[6]	2003
Spain	yes[7]	1994	1994
Sweden	1996	no	no
The Netherlands	no	yes	yes
United Kingdom	no	no	no

1. In Austria, notifiable since 14 April 1913, re-proclaimed 12 June 1947, adapted on 28 April 1950.
2. In Austria, clinical cases notifiable since 1996.
3. In Finland, food business operator has to notify to the competent authority, but there is no central notification system.
4. In Latvia, only clinical cases notifiable.
5. In the Flemish Community.
6. In Slovenia, the year of independence. The disease was notifiable before 1991.
7. In Spain, only hospitalised cases are notifiable.

Appendix Table CA1. Campylobacter monitoring, surveys and diagnostic methods used for humans, animals and food, 2004

	Humans		*Gallus gallus*	
	Sample type	**Diagnostic**	**Sample type**	**Diagnostic**
Austria	Faecal	Bacteriology	At slaughter	Bacteriology
	-	-	*Cattle and pig: colon*	*in cattle at first enrichment*
Czech Republic	-	-	-	-
Denmark	Faecal	Bacteriology	At slaughter: cloacal swabs	PCR
	-	-	At farm[1]: cloacal swabs	Bacteriology
Estonia	Faecal	Bacteriology	-	-
France	-	-	At slaughter: caecal content	Multiplex PCR
Finland	-	Bacteriology	At slaughter: neck skin	NMKL 119:1990 w/no enrichment
	-	-	At slaughter[4]: caecal content	Bacteriology
Germany	-	Bacteriology, ELISA	-	-
Hungary	Faecal	Bacteriology, biochemical	-	-
Italy	-	-	At slaughter[1]: cloacal swabs + ceacal samples	Bacteriology
Latvia	Faecal	Bacteriology	-	-
Lithuania	-	Bacteriology	-	-
Norway	-	Bacteriology	At the farm, before slaughter: faecal samples	NMKL 119:1990 w/no enrichment
	-	Bacteriology	At slaughter: caecum swabs	NMKL 119:1990 w/no enrichment
Portugal	-	-	-	-
Slovakia	-	Bacteriology	-	-
Slovenia	-	Serological and biochemical	-	-
Spain	-	-	Faecal	ISO 6579:2002
Sweden	Faecal and blood	Bacteriology	At slaughter: cloacal and neck skin	NMKL 119:1990
The Netherlands	-	-	At the farm, before slaughter: faecal samples[2]	Bacteriology
	-	-	At the farm, twice/year: Faecal drops[3]	Bacteriology
	-	-	At slaughter: caecum samples[3]	Bacteriology
United Kingdom	-	Bacteriology	-	-

1. Samples collected in context of a monitoring programme of antimicrobial resistance.
2. In The Netherlands, surveillance project.
3. In The Netherlands, plan of approach, PVE.
4. In Finland, study from June to November.

Appendix Table CA1. Campylobacter monitoring, surveys and diagnostic methods used for humans, animals and food, 2004 (cntd.)

	Broiler meat		Other food	
	Sample type	**Diagnostic**	**Sample type**	**Diagnostic**
Austria	-	-	-	ISO 10272:1995
	-	-	-	-
Czech Republic	At slaughter: fresh meat At retail: minced meat	ISO 10272:1995	Poultry meat, fresh, at retail	ISO 10272:1995
Denmark	Depends on survey	-	Food from poultry: meat	-
	-	-	-	-
Estonia	At slaughter: neck skin Retail/processing: fresh meat	NMKL 119:1990, ISO 10272:1995	Retail: Cheeses	NMKL 119:1990, ISO 10272:1995
France	At slaughter: neck skin	-	-	-
Finland	At retail: fresh meat	NMKL 119:1990, modified	Cheeses	NMKL 119:1990, modified
	-	-	-	-
Germany	-	-	-	Comparable to ISO 10272
Hungary	-	-	-	-
Italy	-	-	-	-
Latvia	Fresh meat	ISO 10272:1995	-	-
Lithuania	-	-	-	-
Norway	At retail: fresh meat	NMKL 119:1990	-	-
	-	-	-	-
Portugal	-	-	-	ISO 10272, typing by Lior method
Slovakia	-	STN ISO 10 272	-	-
Slovenia	Fresh meat	ISO 10272:1995	-	-
Spain	-	-	-	-
Sweden	At retail	NMKL 119:1990	-	-
The Netherlands	-	-	-	-
	-	-	-	-
	-	-	-	-
United Kingdom	At retail, fresh refrigerated	ISO 10272:1995	Cheeses	Enrichment method

Appendix Table CA2. Notification on *Campylobacter* in humans, animals and food, 2004

	Notifiable in humans since	Notifiable in animals since	Notifiable in food since
Austria	1947[1, 2]	no	1975
Belgium	<1999	1998	2004
Cyprus	yes	-	-
Czech Republic	yes	no	-
Denmark	1979	no	no
Estonia	1988	2000	yes[9]
Finland	1995	2004[3]	no[4]
France	no	-	-
Germany	no	-	-
Greece	yes	no	-
Hungary	1998	no	no
Ireland	2004	-	-
Italy	1990	no	1962
Latvia	1999	yes[5]	2004
Lithuania	1990	>30 years	-
Luxembourg	-	-	-
Malta	-	-	-
Norway	1991	yes[8]	yes8
Poland	-	-	-
Portugal	-	no	-
Slovakia	1980's	no	2000
Slovenia	1977	1991[6]	2003
Spain	1982[7]	1994	1994
Sweden	1989	no	no
The Netherlands	no	yes	yes
United Kingdom	no	no	no

1. In Austria, notifiable since 14 April 1913, re-proclaimed 12 June 1947, adapted on 28 April 1950.
2. In Austria, clinical cases notifiable since 1996.
3. In Finland, *Campylobacter* notifiable in *Gallus gallus* only.
4. In Finland, food business operator has to notify to the competent authority, but there is no central notification system.
5. In Latvia, only clinical cases notifiable.
6. In Slovenia, the year of independence, however, this disease was notifiable before 1991.
7. In Spain, only hospitalised cases are notifiable.
8. In Norway, only positive samples from *Gallus gallus* detected in the national control programme.
9. In Estonia, only *C. jejuni*.

APPENDIX 2

List of Abbreviations

-	no information available
% Pos	Percent Positive
DT	Definite Type
EBL	European Bat Lyssavirus
EEC	European Economic Committee
EHEC	Enterohemorrhagic *Escherichia coli*
ELISA	Enzyme-Linked Immunosorbent Assay
EU	European Union
FAT	Fluorescent Antibody Test
MS	Member States
N	Number of cases or Number of samples tested
n.a.	not available
Pos	Positive samples
PT	Phage Type
OBF	Officially Brucellosis Free
ObmF	Officially *Brucella melitensis* Free
O.I.E.	Organization Mondiale de la Santé Animale (World Organization for Animal Health)
ORF	Officially Rabies Free
OTF	Officially Tuberculosis Free
PCR	Polymerase Chain Reaction

List of Reporting Countries

Country Abbreviations	Country
A	Austria
B	Belgium
CY	Cyprus
CZ	Czech Republic
DK	Denmark
EST	Estonia
FIN	Finland
F	France
D	Germany
GR	Greece
H	Hungary
IRL	Ireland
I	Italy
LV	Latvia
LT	Lithuania
L	Luxembourg
M	Malta
N	Norway
PL	Poland
P	Portugal
SK	Slovakia
SLO	Slovenia
ES	Spain
S	Sweden
NL	The Netherlands
UK	United Kingdom

MS Classifications

EU-25	All MS
EU-15 (Old MS)	Austria Belgium Denmark Finland France Germany Greece Ireland Italy Luxembourg Portugal Spain Sweden The Netherlands United Kingdom
EU-10 (New MS)	Cyprus Czech Republic Estonia Hungary Latvia Lithuania Malta Poland Slovakia Slovenia
Non-MS	Norway

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